Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada

# BIG PICTURE 2010

## Contaminated Sites in the NWT

Information contained in this publication or product may be reproduced, in part or in whole, and by any means, for personal or public non-commercial purposes, without charge or further permission, unless otherwise specified.

You are asked to:

- Exercise due diligence in ensuring the accuracy of the materials reproduced;
- Indicate both the complete title of the materials reproduced, as well as the author organization; and
- Indicate that the reproduction is a copy of an official work that is published by the Government of Canada and that the reproduction has not been produced in affiliation with, or with the endorsement of the Government of Canada.

Commercial reproduction and distribution is prohibited except with written permission from the Government of Canada's copyright administrator, Public Works and Government Services of Canada (PWGSC). For more information, please contact PWGSC at: 613-996-6886 or at: droitdauteur.copyright@tpwgs-pwgsc.gc.ca.

Published under the authority of the Minister of Indian Affairs and Northern Development and Federal Interlocutor for Métis and Non-Status Indians

Ottawa, 2010
www.ainc-inac.gc.ca
1-800-567-9604
TTY only 1-866-553-0554

QS-Y248-000-EE-A4
Catalogue No R71-69/2010E
ISBN 978-1-100-16245-4

© Minister of Public Works and Government Services Canada

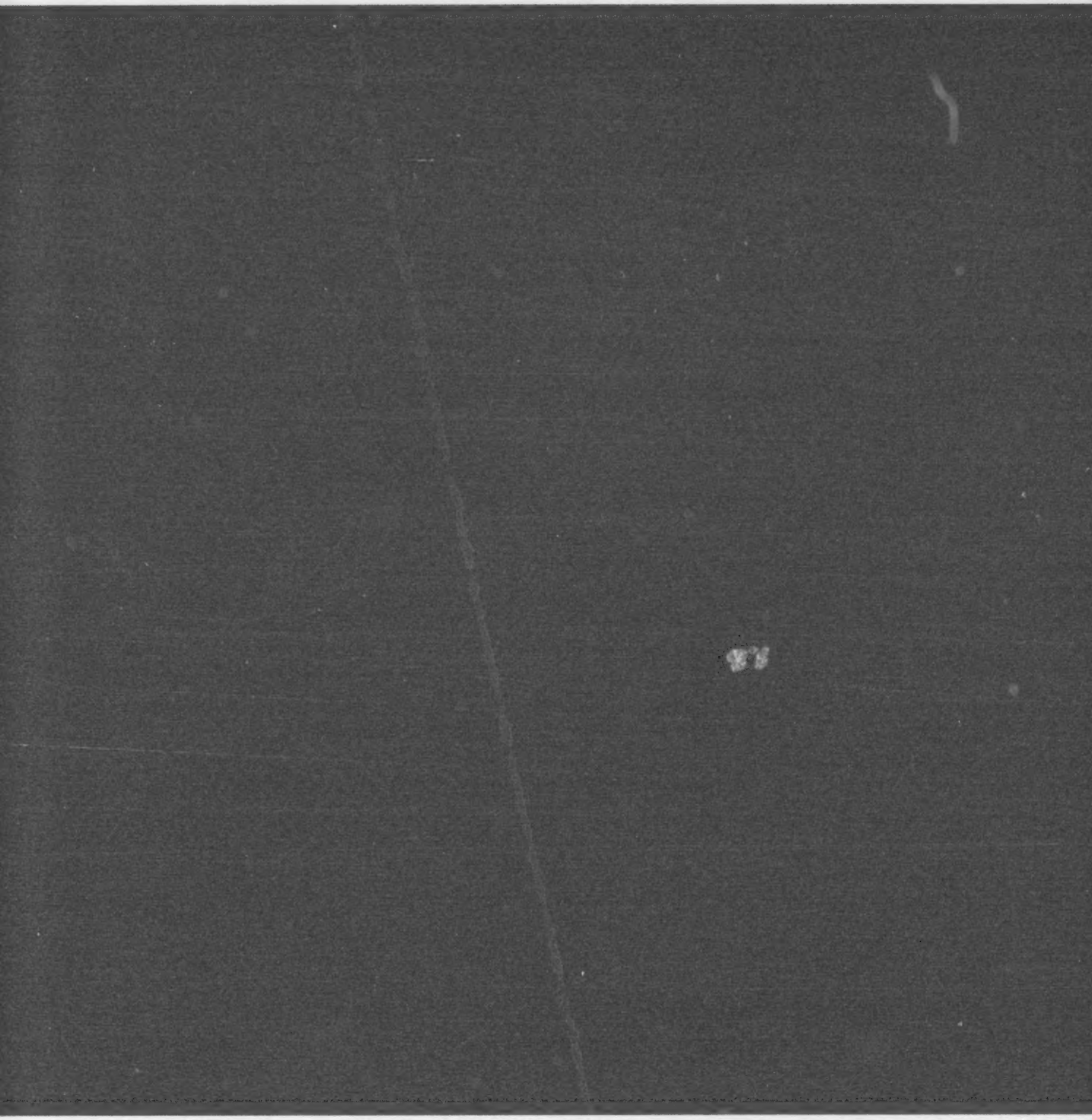
Cette publication est aussi disponible en français sous le titre : Vue d'ensemble – Les sites contaminés des T.N.-O. 2010

This booklet, *The Big Picture,* contains information related to contaminated sites in the Northwest Territories, and the remediation of those sites under the jurisdiction of Indian and Northern Affairs Canada (INAC).

You'll find information about the remediation process for contaminated sites, and descriptions of some contaminants and hazards commonly found there.

As well, *The Big Picture* contains summaries of current remediation activities occurring at the high priority sites, as well as information about the Federal Contaminated Sites Action Plan and doing business in the NWT for contaminated sites remediation.

Please check INAC's NWT Contaminants and Remediation website at www.ainc-inac.gc.ca/ai/scr/nt/cnt/index-eng.asp for the most up-to-date information on contaminated sites in the NWT.



# CONTENTS


**6 INAC's Mandate**

**7 Protecting the North**

**8 Northern Contaminants Program**

**9 Federal Contaminated Sites Action Plan (FCSAP)**

**11 FCSAP 10-Step Process**

**12 Public Involvement**

**16 SITES IN THE INUVIALUIT SETTLEMENT REGION (ISR)**

17 Tununuk (BAR-C) DEW Line
18 Johnson Point Staging Facility
19 Victoria Island Mineral Exploration Sites
19 Horton River (BAR-E) DEW Line
20 Atkinson Point (BAR-D) DEW Line
20 Kittigazuit Bay Military Site
21 Pearce Point (PIN-A) DEW Line

**22 SITES IN THE SAHTU SETTLEMENT AREA**

23 Canol Trail
24 Contact Lake Mine
24 El Bonanza
24 Sawmill Bay
24 Silver Bear Properties
26 Port Radium Mine

**28 SITES IN THE WEK'EEZHII AREA**

29 Chalco Lake Mine
29 Diversified/Indigo Mine
30 Indore/Beaverlodge (Hottah) Mines
31 Spider Lake
31 Colomac Mine
33 Rayrock Mine
34 North Inca Mine

**35 SITES IN AREAS SUBJECT TO ON-GOING COMPREHENSIVE LAND CLAIM NEGOTIATION**

37 Bullmoose Mine/Ruth Mine Area
37 Great Slave Lake Area
38 Stark Lake Advanced Exploration Site
39 Tundra Mine
40 Hidden Lake Mine
40 Checkpoint Highway Maintenance Yard
41 Hay River Sour Gas Wells
42 Giant Mine
43 Discovery Mine
44 Axe Point Military Site

**45 What is Found at NWT Contaminated Sites**

**46 Commonly Used Terms and Acronyms**

# INAC's Mandate

The Contaminants and Remediation Directorate (CARD) brings together all of the work done by Indian and Northern Affairs Canada (INAC) associated with federal contaminated sites in the NWT, and the Northern Contaminants Program (NCP).

CARD is currently managing over 30 contaminated sites in the NWT, at various stages of remediation. Many of these sites became the Government of Canada's responsibility after private owners relinquished their properties according to the legislation of the day, or when companies went bankrupt. The properties then reverted to the Crown, and as representative of the Crown, INAC became the custodian of these properties and the related remediation activities.

To guide its efforts, INAC created the Contaminated Sites Management Policy in 2002. To find out more about this policy, please visit the INAC website at **www.ainc-inac.gc.ca/enr/cts/pubs/manpol/manpol-eng.asp.**

The department is committed to communicating with NWT residents regarding the remediation of contaminated sites, and providing economic opportunities for northerners wherever possible.

# Protecting the North

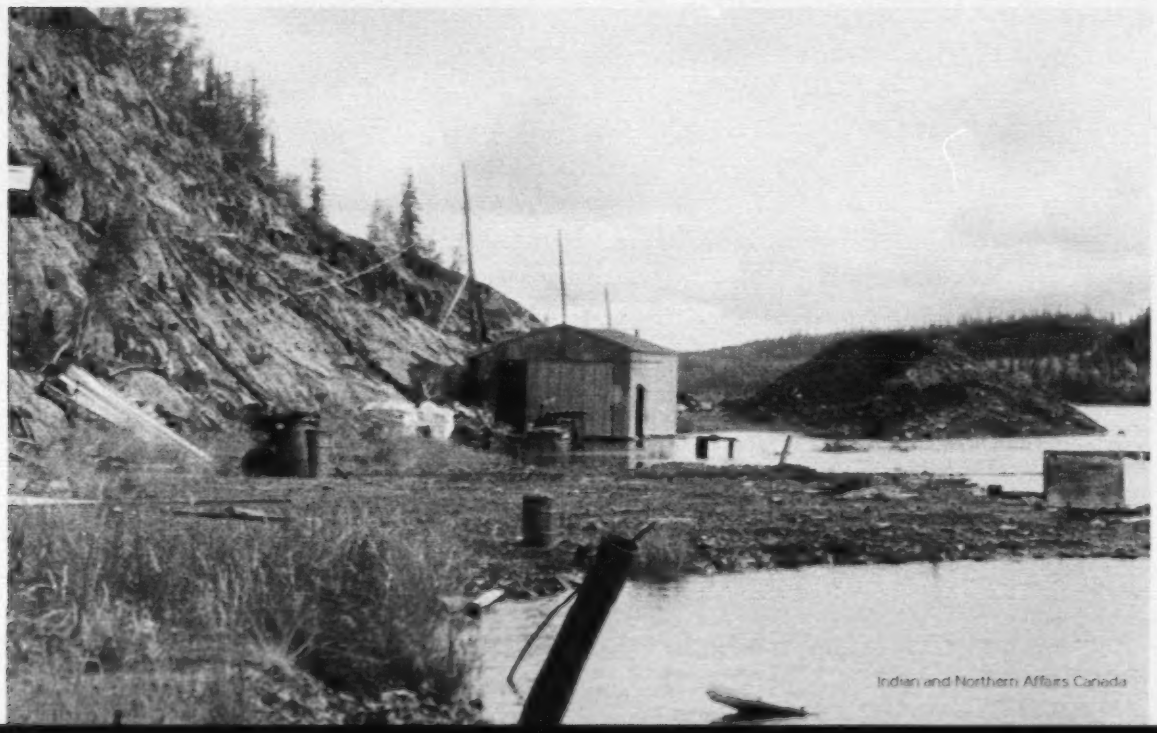
The Government of Canada recognizes that not only is it important to remediate federal contaminated sites, it is also necessary to prevent them from occurring in the future.

Today, there is a suite of legislation protecting the North. It includes the *NWT Waters Act,* the *Mackenzie Valley Resource Management Act* and the Territorial Lands Regulations and the Contaminated Sites Management Policy. Pollution prevention and "polluter pays" are two of the key elements of the Contaminated Sites Management Policy.

As well, because of the importance of mining to the NWT, INAC also instituted the Mine Site Reclamation Policy for the NWT, which reflects the Government of Canada's commitment to ensure that new mining operations do not leave a legacy of environmental and human health hazards or a financial liability for the Canadian taxpayer.

Technologies associated with mine site remediation are continually improving, as are mining practices. For example, most mining operations now incorporate progressive remediation. This is a "clean up as you go" approach, which has become the standard operating procedure for mining in the North. This efficient, effective approach is in everyone's best interests and the Mine Site Reclamation Policy reflects this approach.

For more information on the NWT's Mine Site Reclamation Policy, please visit **www.ainc-inac.gc.ca/nth/mm/pubs/recpolnwt/recpolnwt-eng.asp.**



# Northern Contaminants Program (NCP)

The NCP is working to reduce and, wherever possible, eliminate contaminants from long range sources in traditionally harvested foods, while providing information that assists informed decision making by individuals and communities in their food use.

**What is the Northern Contaminants Program?**

The Northern Contaminants Program was established in 1991 in response to concerns about human exposure to elevated levels of contaminants in wildlife species that are important to the traditional diets of northern Aboriginal peoples. Early studies found a wide variety of substances, many of which had no Arctic or Canadian sources, but which were, nevertheless, reaching unexpectedly high levels in the Arctic ecosystem.

The geographic focus of the NCP is the Yukon, Northwest Territories, Nunavut, Nunavik and Nunatsiavut. The NCP is directed by an interagency Management Committee chaired by Indian and Northern Affairs Canada, which is responsible for establishing NCP policy and research priorities, and for making final decisions on the allocation of funds. Funding for the NCP's $4.8 million annual budget comes from Indian and Northern Affairs Canada and Health Canada.

The Management Committee is supported by Regional Contaminants Committees in each of the five northern regions. The Northwest Territories Regional Contaminants Committee (NWT-RCC) develops and coordinates a comprehensive regional contaminants research program and establishes priorities for the territory. The NWT-RCC includes an extensive membership of regional NWT Aboriginal organizations, and federal and territorial government departments and has linkages to communities, regional health boards, and community health representatives. It develops strategies and priorities for collaborative study, and provides information to the public about the presence and possible effects of contaminants. In association with the Government of the Northwest Territories Department of Health, information is also provided to the public on the risks and benefits of consuming traditional foods.

The NCP allocates funds for research and related activities in five main areas:

- Human Health
- Environmental Monitoring and Research
- Community Based Monitoring and Research
- Communications, Capacity, and Outreach
- National/Regional/International Coordination and Aboriginal Partnerships

**Research in the NWT has included:**

**Sahtu Settlement Area**

- Mercury levels in Trout and Walleye at Kelly Lake and Lac Ste. Therese.
- Contaminant levels (Mercury, PCBs, Persistent Organic Pollutants) in Burbot at the Rampart Rapids of the Mackenzie River.

**Wek'eezhii Area and Areas Subject to On-going Negotiations**

- Mercury levels in Trout at Cli Lake and Trout Lake.
- Contaminant levels (Mercury, PCBs, Persistent Organic Pollutants) in Trout and Burbot on Great Slave Lake near Lutsel K'e and Fort Resolution

**Inuvialuit Settlement Region**

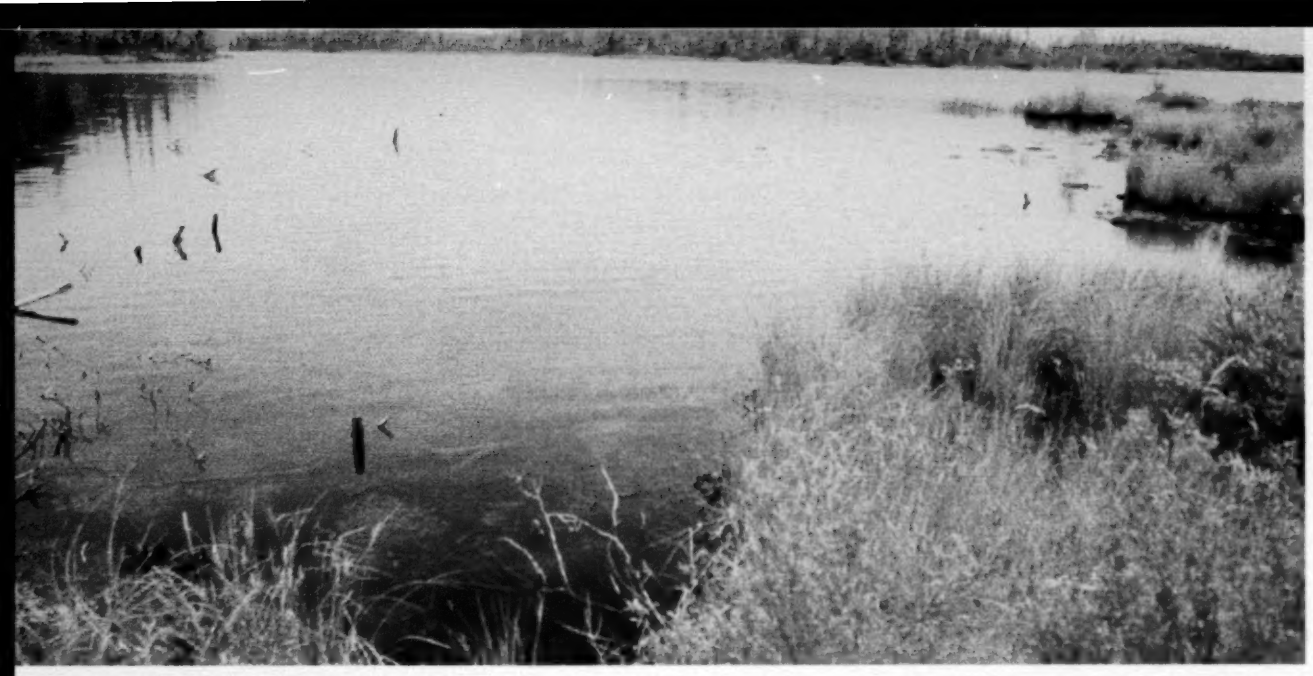
- Contaminant levels (Mercury, PCBs, Persistent Organic Pollutants) in Ringed Seals near Ulukhaktok and Sachs Harbour.
- Contaminant levels (Mercury, PCB, DDT) in Beluga Whales near Hendrikson Island.
- Communication project to communicate contaminants information on Beluga Whales to the public.
- Effective and appropriate communications between researchers and Inuvialuit communities about contaminants – What do the community members want to know about contaminants?
- Mercury in the food chains of the Beaufort Sea – Where is it coming from?
- Predicting mercury concentrations in predatory water, particles and plankton in order to predict mercury concentrations in predatory mammals.
- Sources of mercury in Arctic marine food chains.

# Federal Contaminated Sites Action Plan (FCSAP)

## What is FCSAP?

The Federal Contaminated Sites Action Plan (FCSAP) is a cost-shared program that supports federal departments, agencies and consolidated Crown corporations in addressing contaminated sites for which they are responsible. The primary objective of this program is to address the risks that these sites pose to human health and the environment, and to reduce the associated financial liability.

The goal of the 15-year FCSAP program is to complete the assessment and remediation or risk management of highest-risk federal contaminated sites.



## Who administers FCSAP?

FCSAP is administered jointly by Environment Canada, which houses the FCSAP Secretariat, and the Treasury Board Secretariat of Canada, which ensures consistency with Treasury Board policies on the management of federal real property.

## What government departments are involved?

Indian and Northern Affairs Canada and the Department of National Defence have responsibility for many of the contaminated sites. These include military installations and other sites related to national defence activities on federal Crown lands dating back over half a century, long before the environmental impacts of such activities were adequately understood or managed. INAC also inherited responsibility for many former mines in the North after they were abandoned, or through bankruptcy proceedings and court decisions.

Four federal government departments—Health Canada, Fisheries and Oceans Canada, Environment Canada, and Public Works and Government Services Canada—are responsible for providing expert support to custodians, the FCSAP Secretariat and the Federal Contaminated Sites Associate Deputy Minister Steering Committee.

## What types of projects are eligible?

Three types of projects are eligible under FCSAP:

1. Assessment, which involves a detailed analysis of the site to identify the nature and extent of the contamination
2. Immediate care and maintenance to manage an imminent environmental threat
3. Remediation/risk management actions, in which various alternatives for addressing contaminated sites are developed and reviewed before a final option is recommended to reduce the risk to human health and the environment

## How many sites will FCSAP address?

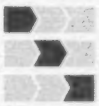
The Treasury Board of Canada maintains the Federal Contaminated Sites Inventory. The inventory includes all known contaminated sites for which federal departments and agencies are accountable. There are over 18,000 such sites in the inventory, from across Canada. To view the inventory, visit the Treasury Board Secretariat website at **www.tbs-sct.gc.ca/fcsi-rscf/home-accueil-eng.aspx.**

For more information on the *Federal Contaminated Sites Action Plan,* visit **www.federalcontaminatedsites.gc.ca/fcsap_pascf/index-eng.aspx.**

# FCSAP 10-Step Process

In 1999, the Contaminated Sites Management Working Group released the document *A Federal Approach to Contaminated Sites* outlining a ten-step process for addressing a federal contaminated site. These guidelines were developed to ensure a common approach to the management of contaminated sites.

LEGEND:



**Assessment Phase**

**Remediation Phase**

**Complete / Monitoring Phase**

| STEP | | PHASE | DESCRIPTION |
|---|---|---|---|
| 1 | Identify possible sites | | Identify potentially contaminated sites based on activities (past or current) on or near the site. |
| 2 | Perform historical review | | Assemble and review all historical information pertaining to the site. |
| 3 | Perform initial testing | | Determine a preliminary characterization of contamination and site conditions. |
| 4 | Classify site and assign priority | | Classify contaminated site using the Canadian Council of Ministers of the Environment (CCME) National Classification System. Prioritize the site for future investigations and/or remediation/risk management actions. |
| 5 | Conduct detailed testing | | Test specific areas of concern identified in Step 3 and conduct further in-depth investigations and analysis. |
| 6 | Reclassify site if necessary | | Update the ranking based on the results of the detailed investigations, using CCME National Classification System. |
| 7 | Develop remediation / risk management plan | | Develop a site-specific plan to address contamination issues. |
| 8 | Implement remediation/ risk management plan | | Implement the site-specific plan that addresses contamination issues. |
| 9 | Conduct confirmatory sampling | | Verify and document the success of the remediation/ risk management strategy. |
| 10 | Conduct long-term monitoring | | If required, ensure that remediation and long-term risk management goals are achieved. |

# Public Involvement

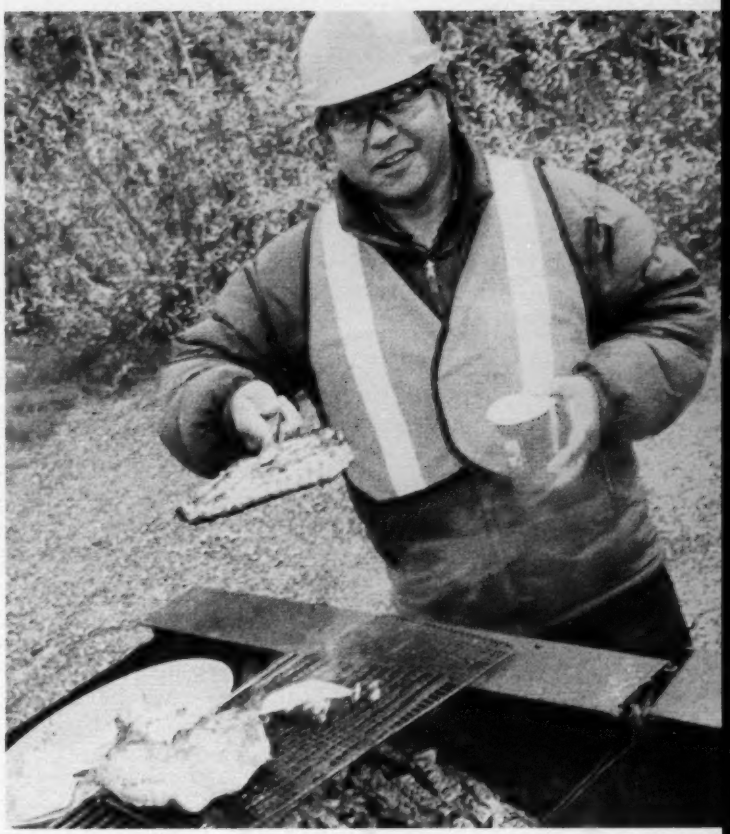
## The Key to Successful Remediation Projects in the North

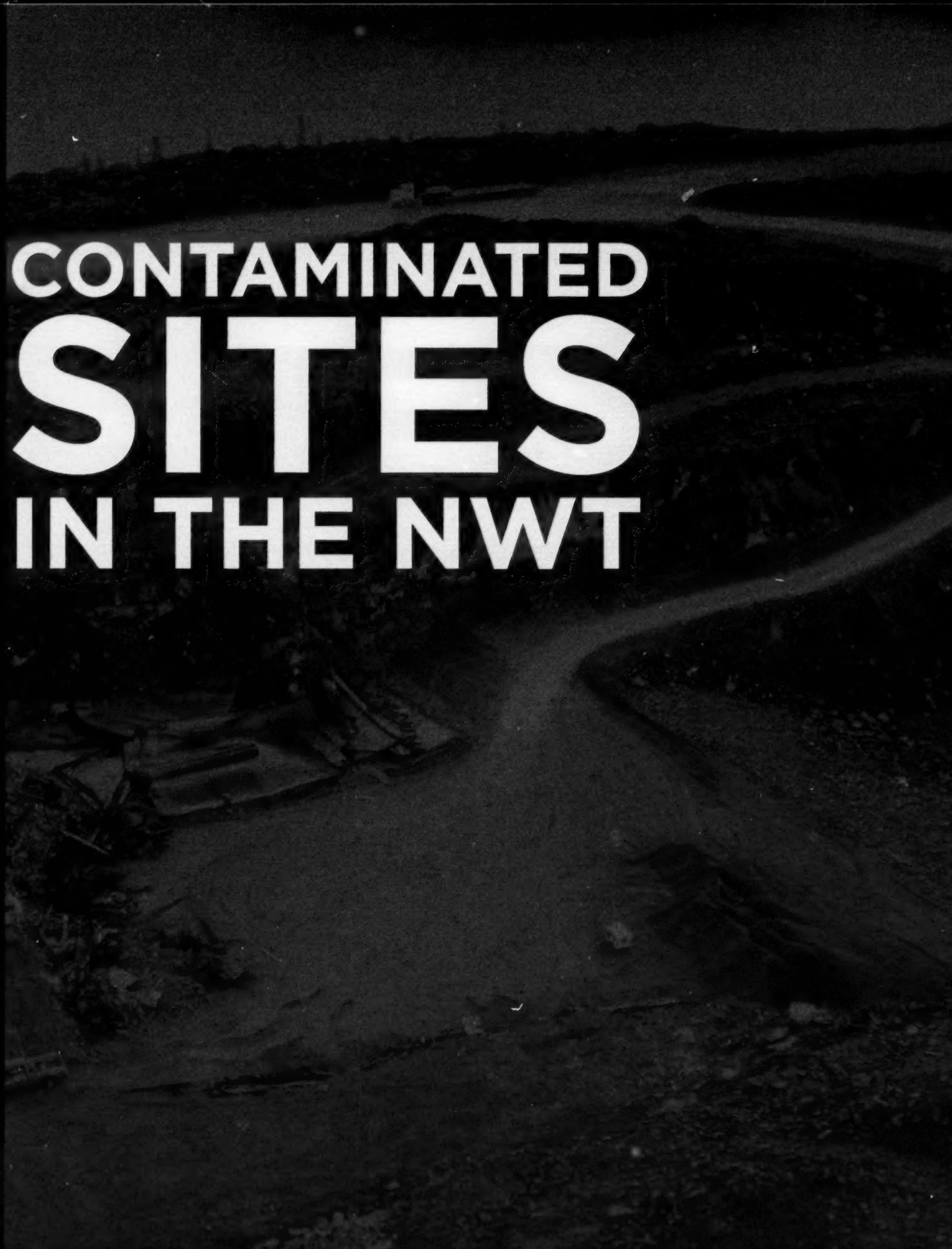
The Contaminants and Remediation Directorate (CARD) believes that the key to a successful remediation project is the involvement of stakeholders—that is, community members, governments, industry, and the general public—in all stages of the remediation, when possible.

Public involvement is important because it:

- Builds trust amongst all parties
- Increases capacity of all parties by increasing knowledge and understanding
- Improves decision-making process
- Avoids conflicts by identifying and addressing critical stakeholders and issues early in the process
- Develops mutual understanding and improves relationships so that long-standing disagreements can be addressed
- Creates real and lasting change by designing and implementing a process that addresses community priorities in a meaningful way

For more information on public involvement best practices for the remediation of contaminated sites, please visit the Health Canada website at **www.hc-sc.gc.ca/ewh-semt/contamsite/public/index-eng.php.**





# CONTAMINATED SITES IN THE NWT

# Contaminated Sites in the NWT

## Inuvialuit Settlement Region (ISR)


| | | |
|---|---|---|
| 1 | Tununuk (BAR-C) DEW Line | Page 17 |
| 2 | Johnson Point Staging Facility | Page 18 |
| 3 | Victoria Island Mineral Exploration Sites | Page 19 |
| 4 | Horton River (BAR-E) DEW Line | Page 19 |
| 5 | Atkinson Point (BAR-D) DEW Line | Page 20 |
| 6 | Kittigazuit Bay Military Site | Page 20 |
| 7 | Pearce Point (PIN-A) DEW Line | Page 21 |


## Wek'eezhii Area

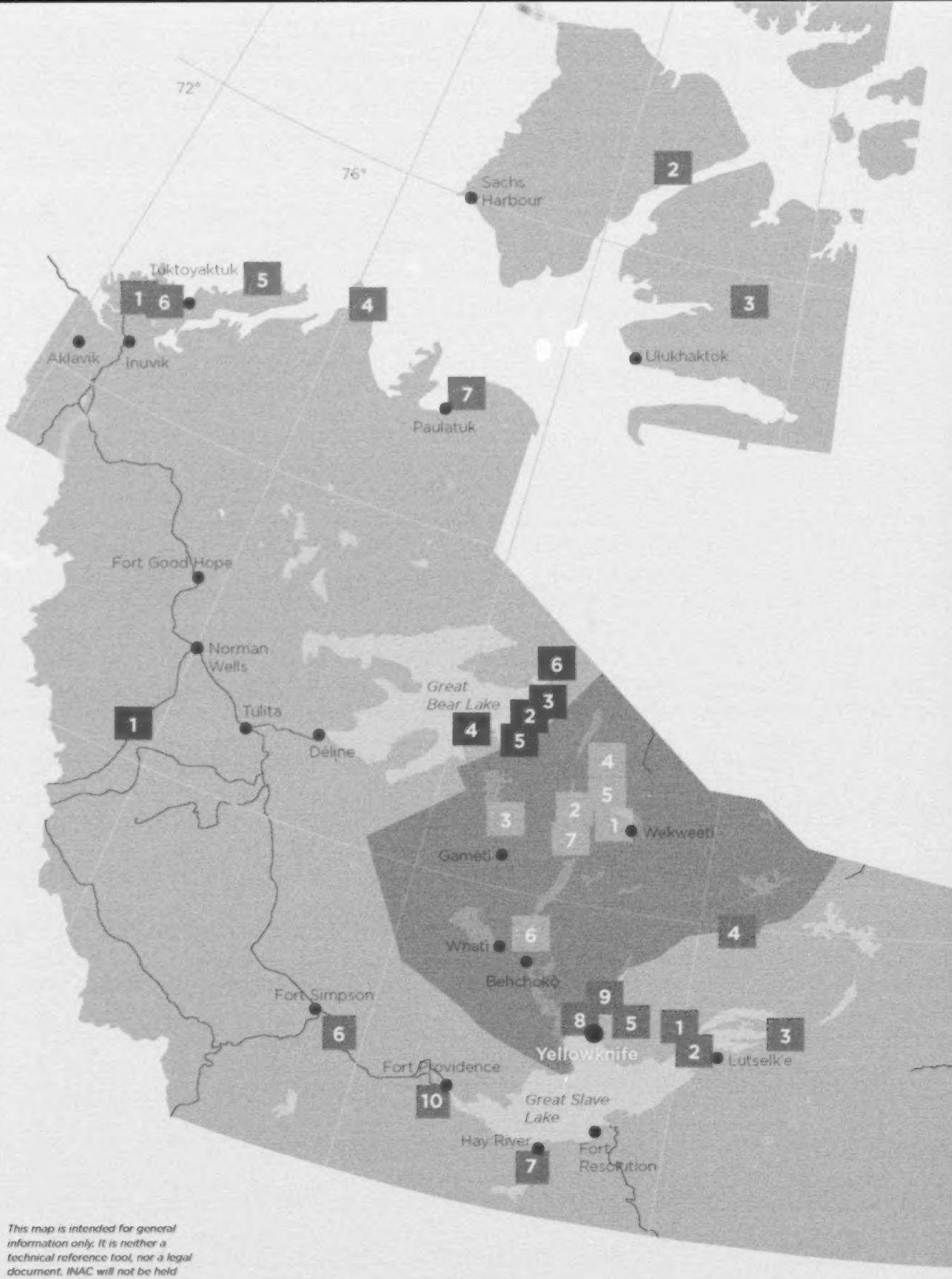

| | | |
|---|---|---|
| 1 | Chalco Lake Mine | Page 29 |
| 2 | Diversified/Indigo Mine | Page 29 |
| 3 | Indore/Beaverlodge (Hottah) Mines | Page 30 |
| 4 | Spider Lake | Page 31 |
| 5 | Colomac Mine | Page 31 |
| 6 | Rayrock Mine | Page 33 |
| 7 | North Inca | Page 34 |


## Sahtu Settlement Area


| | | |
|---|---|---|
| 1 | Canol Trail | Page 23 |
| 2 | Contact Lake Mine | Page 24 |
| 3 | El Bonanza | Page 24 |
| 4 | Sawmill Bay | Page 24 |
| 5 | Silver Bear Properties | Page 24 |
| 6 | Port Radium Mine | Page 26 |


## Sites in areas subject to on-going comprehensive land claim negotiation


| | | |
|---|---|---|
| 1 | Bullmoose Mine/ Ruth Mine Area | Page 37 |
| 2 | Great Slave Lake Area | Page 37 |
| 3 | Stark Lake Advanced Exploration Site | Page 38 |
| 4 | Tundra Mine | Page 39 |
| 5 | Hidden Lake Mine | Page 40 |
| 6 | Checkpoint Highway Maintenance Yard | Page 40 |
| 7 | Hay River Sour Gas Wells | Page 41 |
| 8 | Giant Mine | Page 42 |
| 9 | Discovery Mine | Page 43 |
| 10 | Axe Point Mine | Page 44 |




*This map is intended for general information only. It is neither a technical reference tool, nor a legal document. INAC will not be held liable for any errors or inaccuracies.*

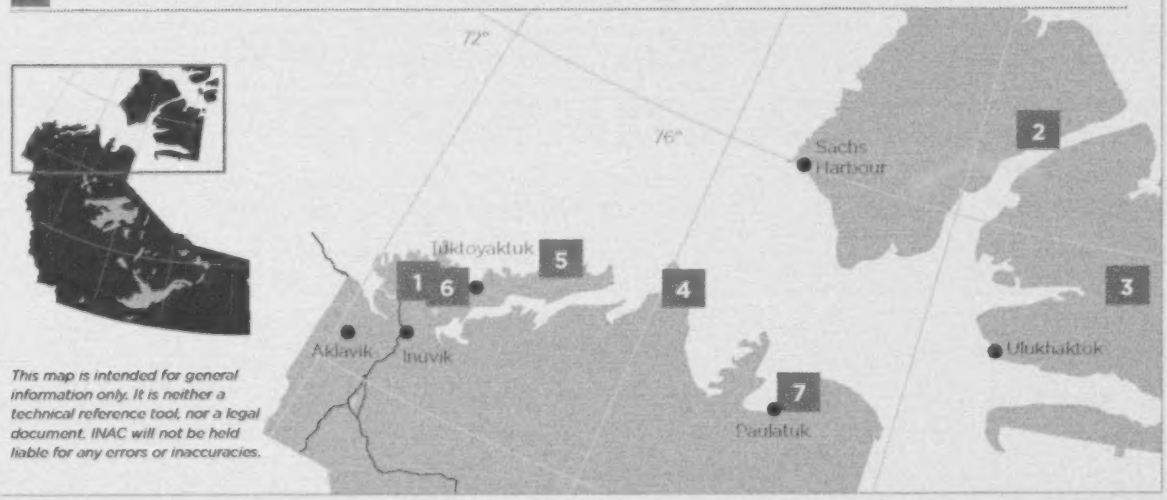
# Sites in the Inuvialuit Settlement Region (ISR)

In 1984 the Canadian Government reached a comprehensive Aboriginal land claim agreement with the Inuvialuit, called the Inuvialuit Final Agreement (IFA) through the passing of the *Western Arctic Claims Settlement Act*. The area covered by this agreement, known as the Inuvialuit Settlement Region (ISR), totals approximately 1,000,000 km$^2$ and is situated in the northwest corner of the Northwest Territories, Canada.

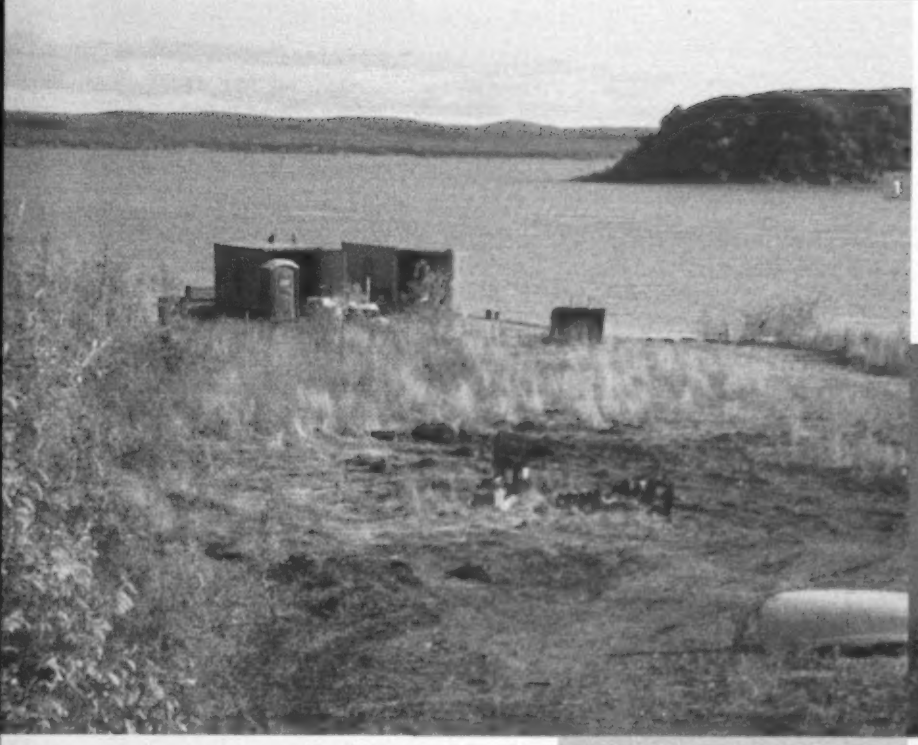
The ISR includes six communities: Paulatuk, Ulukhaktok (formerly Holman), Sachs Harbour, Tuktoyaktuk, Inuvik and Aklavik. The region is home to the Inuvialuit, whose three linguistic dialects are collectively known as the Inuvialuktun language.

A number of contaminated sites have been identified and prioritized in the ISR region and identification and assessment is ongoing.

| NO. | SITE NAME | PHASE | PAGE |
|---|---|---|---|
| 1 | Tununuk (BAR-C) DEW Line | | 17 |
| 2 | Johnson Point Staging Facility | | 18 |
| 3 | Victoria Island Mineral Exploration Sites | | 19 |
| 4 | Horton River (BAR-E) DEW Line | | 19 |
| 5 | Atkinson Point (BAR-D) DEW Line | | 20 |
| 6 | Kittigazuit Bay Military Site | | 20 |
| 7 | Pearce Point (PIN-A) DEW Line | | 21 |




*This map is intended for general information only. It is neither a technical reference tool, nor a legal document. INAC will not be held liable for any errors or inaccuracies.*

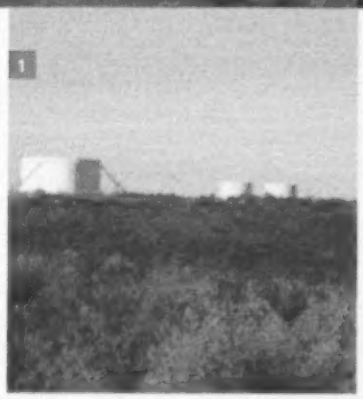


## 1 Tununuk (BAR-C) DEW Line

Tununuk, or "BAR-C", was a former intermediate Distant Early Warning (DEW) line site located approximately 90 km northeast of Inuvik on the Mackenzie River. The site was also used by Imperial Oil Limited (IOL) as a staging area. Today, a tank farm, belonging to Imperial Oil covers a portion of the site. Imperial Oil maintains a lease for the tank farm with the Inuvialuit Land Administration.

### CONCERNS AT THE SITE

The main contaminants found on the site are hydrocarbon contaminated soil, buried fuel drums, asbestos, lead-based paints as well as general non-hazardous waste. There are also washed-out roads, two old sewage lagoons, and an unmaintained airstrip which is unusable in its present condition.



### REMEDIATING THE SITE

A Phase I and II Environmental Site Assessment (ESA) was completed in 2001 by Imperial Oil to identify concerns. In 2008, a Phase III ESA was conducted jointly by INAC and IOL to determine the presence and extent of contaminated soils, landfills, and building debris.Based on the results of the assessment, one additional season of assessment was required at the site to quantify the volumes of contaminated soils and to address other information gaps identified by the peer-review of the Phase III ESA.

This contract was equally cost-shared between INAC and Imperial Oil and the work was completed in September 2010. An archaeological survey was also conducted to investigate two previously recorded burial sites.

### FUTURE PLANS

The results of the Phase III ESA will be used to develop remedial options which would then be evaluated through community consultation during the winter of 2010/11. Further negotiations between INAC and Imperial Oil will also be required to determine the plan forward. ■

## 2 Johnson Point Staging Facility

Point site was an abandoned oil and gas exploration support and staging area located approximately 270 km northeast of Sachs Harbour on Banks Island, along the Prince of Wales Strait, in the Northwest Territories. The site was used by several exploration companies from the early 1960s until the early 1980s, when the site was abandoned and responsibility for the facilities reverted to the Crown. It continues to be used as a base for mineral exploration, a fuel cache location and an alternate airstrip for traveling farther north.

### CONCERNS AT THE SITE

Through site assessment, a number of issues were identified. These included the presence of hydrocarbons in soils, waste oil and other liquid wastes. Several buildings on the site were also found to contain asbestos and

lead-based paints. General debris and waste metal scattered around the area also presented a safety risk to people or wildlife.

### REMEDIATING THE SITE

Remediation activities concluded in 2009 with the successful treatment of about 23,000 $m^3$ of hydrocarbon contaminated soil from the Tank Farm areas and an area at the end of the airport runway called the Apron Area. Other activities included waste consolidation and dismantling of the remaining tanks and buildings at the site. Remediation finished just prior to freeze-up and the arrival of the first snow in late September. Early ice conditions in the Strait prevented the contractor from demobilizing their equipment and remaining debris. The project therefore required a third year of remediation to allow for demobilization which was successfully completed in August 2010. To celebrate the successful site remediation, a site closure tour and celebration were held for Elders and representatives from Sachs Harbour and Ulukhaktok in August 2010.

### FUTURE PLANS

Short-term monitoring at Johnson Point began in 2010 and includes visual inspection and periodic collection of soil samples from the non-hazardous landfills. It also includes monitoring groundwater and the re-establishment of permafrost in the areas where there was hydrocarbon contamination to ensure long-term physical stability. The site is scheduled to be monitored again in 2012 and 2014. ■

## 3 Victoria Island Sites Mineral Exploration Sites

The six sites composing the Muskox Mine Syndicate and Grandroy Mine Exploration Area were cleaned up as a group because they were close together and had the same types of contamination. The sites were former exploration camps and airstrips located northeast of Ulukhaktok in the Shaler Mountain region of Victoria Island.

### CONCERNS AT THE SITE

Concerns at the site included waste materials, fuel, approximately 400 fuel drums and a Nodwell snow cat frame.

### REMEDIATING THE SITE

In 2009, all waste materials from the six sites were consolidated and grouped into two locations so they could easily be picked up by airplane. This occurred in the spring and summer of 2010 with all waste materials being shipped initially to Ulukhaktok and then on to Yellowknife for disposal in a licensed facility. Everything but the Nodwell snow cat was removed from the sites. Tests from the vehicle indicate that the lead in the paint is non-leaching and therefore is not a risk to human health and can be safely left in place.

### FUTURE PLANS

The concerns at the six sites have been removed and full remediation has been completed. No monitoring is required. ■

3

3

## 4 Horton River (BAR-E) DEW Line

Horton River was a DEW Line Intermediate Site also referred to as BAR-E or Malloch Hills.

### CONCERNS AT THE SITE

Concerns at the site included hazardous surface waste, non-hazardous debris and contaminated soils.

### REMEDIATING THE SITE

The site was remediated in the summer of 1994 under the terms of a Cooperation Agreement between the Inuvialuit Lands Administration and INAC. The cleanup involved the construction of a landfill on top of an existing dump, the removal of hazardous surface waste, and the collection of non-hazardous debris and contaminated soils into the new landfill. INAC committed to monitor the stability of the landfill. A monitoring program was approved in the summer of 1997, and involves geotechnical, thermal and groundwater monitoring of the site.

3

FUTURE PLANS

The present monitoring program follows the 25 year landfill monitoring protocol of the Department of National Defence, which calls for annual inspections for the first five years and then monitoring in years seven, 10, 15 and 25. Following this protocol, inspections were carried out every year from 2003 to 2007 and again in 2009. Inspections indicated there are no visible changes from erosion, but monitoring should continue according to the protocol. Further monitoring is scheduled for 2012, 2017 and 2027. ■

## 5 Atkinson Point (BAR-D) DEW Line

Atkinson Point, otherwise known as BAR-D, was an Intermediate DEW Line site approximately 80 km northeast of Tuktoyaktuk by McKinley Bay. This military radar site was constructed in 1957 and operated until 1963. The land reverted to INAC in 1965 and until 1981 it was made available to government and university groups for scientific use. Several surface dispositions—such as permits and leases—were issued in the area of the site.

CONCERNS AT THE SITE

The site included several sources of PCBs, heavy metals and soils containing hydrocarbons. Several landfills, barrels and fuel tanks, and buildings containing PCB-amended and/or lead-based paint and asbestos also remained on site.

REMEDIATING THE SITE

Remediation work was completed in 2008. This included removal of hazardous waste from site, demolition of buildings and tanks, disposal off-site of non-hazardous waste, collection of surface and shallow subsurface waste, and remediation of fuel-contaminated soils through a mechanical aeration process called "alluing."

FUTURE PLANS

In 2009, a final inspection was conducted to ensure remediation work at the site had been successful. Visual inspections of the former buried debris areas in 2009 and 2010 indicate that they are performing well and that the site is in stable condition. ■

## 6 Kittigazuit Military Site

The Kittigazuit Military site, located near Kittigazuit Bay, between Inuvik and Tuktoyaktuk, was used as a long-range aid to navigation site (LORAN) by the military. It was a significant LORAN site in the northern region, built in 1947 and operated from 1948 to 1950. After the LORAN project was shut down, the site was used as a waste metal depot by INAC.

CONCERNS AT THE SITE

Through site assessment, it was determined there was DDT and metal contaminated soils, hydrocarbon contaminated soils and asbestos waste associated with the buildings. There was also debris on site, including unidentified barrels, decaying buildings and equipment.

### REMEDIATING THE SITE

A large portion of the remediation was completed in 2002/03 including a major hydrocarbon delineation program to determine the volume of fuel contaminated soil. This was completed through a contribution agreement with Inuvialuit Projects Inc., a subsidiary of the Inuvialuit Development Corporation. Remediation continued in 2004 with activities focusing on excavating hydrocarbon contaminated soil and placing it into sealed containers which were disposed of off-site, and conducting a geophysical survey to confirm there were no other sources of contamination below the surface.

Contaminated soil on the site has been removed, and the full site remediation has been completed. According to the Inuvialuit Final Agreement, the Kittigazuit site was to become part of Inuvialuit Lands when the site was cleaned up. Now that the remediation is complete, the Kittigazuit site has been transferred back to the Inuvialuit.

### FUTURE PLANS

The site has been remediated and inspection tours are complete. No further monitoring is required. ■

## 7 Pearce Point (PIN-A) DEW Line

Under the Inuvialuit Final Agreement, this site was to become part of Inuvialuit Lands when the site was cleaned up. Now that the remediation is complete, the Pearce Point site has been transferred back to the Inuvialuit.

### FUTURE PLANS

The site has been remediated and inspection tours are complete. No further monitoring is required. ■

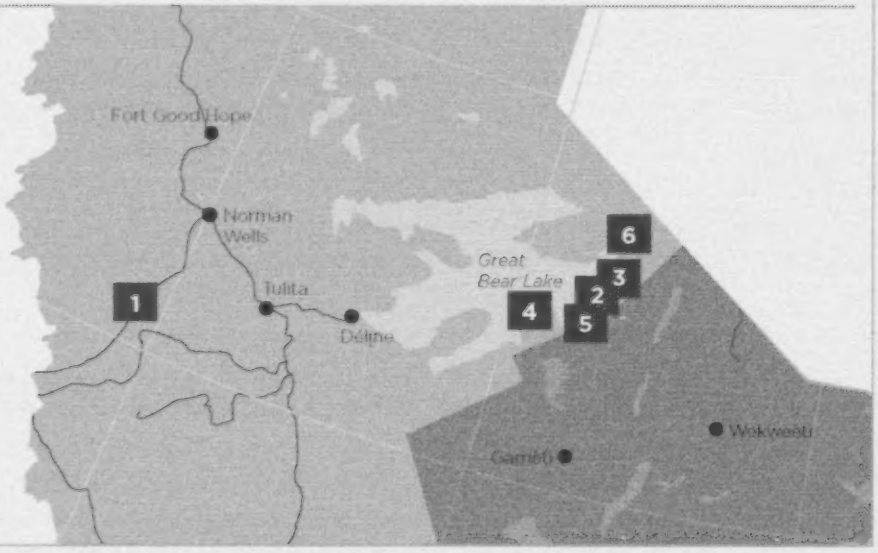
# Sites in the Sahtu Settlement Area

The *Sahtu Dene and Métis Land Claim Settlement Act* came into effect on June 23, 1994. The agreement provides the Sahtu Dene and Métis with title to 41,437 km² of land in the Northwest Territories, an area slightly larger than Vancouver Island. Subsurface rights are included on 1,813 km² of this land.

There are five communities in the Sahtu Settlement Area: Déline, Tulita, Norman Wells, Fort Good Hope, and Colville Lake. The traditional language of the Sahtu is North Slavey.

A number of contaminated sites have been identified and prioritized in the Sahtu Region, and identification and assessment is ongoing.

| NO. | SITE NAME | PHASE | PAGE |
|---|---|---|---|
| 1 | Canol Trail | | 23 |
| 2 | Contact Lake Mine | | 24 |
| 3 | El Bonanza Mine | | 24 |
| 4 | Sawmill Bay | | 24 |
| 5 | Silver Bear Properties | | 24 |
| 6 | Port Radium Mine | | 26 |




*This map is intended for general information only. It is neither a technical reference tool, nor a legal document. INAC will not be held liable for any errors or inaccuracies.*

## 1 Canol Trail

The Canol Trail was part of the CANOL (Canadian Oil) Project, a cooperative effort between the United States and Canada during World War II to ensure a continuous supply of oil from Norman Wells, NWT to American forces stationed in the Pacific. Between 1942 and 1945, the CANOL Project included the construction of the Canol Road, maintenance camps, bridges (65) and culverts (820). A four inch pipeline was laid directly on the ground alongside the road and, in order to keep the oil flowing, six pump stations were constructed consisting of a pumphouse, above ground storage tanks, a generator building, a mess hall and a dormitory.

Three U.S. Army repeater stations were also constructed and a telephone line, following roughly the same route as the pipeline, connected all the pumping stations and terminals. Oil flowed along the route to Whitehorse starting in April 1944, but one year later, the entire project was abandoned. Remnants of the project remain along the NWT portion of the trail which stretches 372 km southwest from Norman Wells to the Yukon border and is located in the Sahtu Land Claim region.

### CONCERNS AT THE SITE

Concerns at the sites include hydrocarbon contamination, asbestos-containing materials, crude oil storage and separator tanks, lead-containing paint, hazardous fluids and materials associated with abandoned vehicles and physical debris such as dilapidated buildings and bridges, drums, communications wire, abandoned pipeline and rusty vehicles.

### REMEDIATING THE SITE

Between 2007 and 2009, CARD conducted aerial and ground reconnaissance of the entire Canol Trail and compiled an inventory of abandoned waste materials and areas of potential contamination. Phase II Environmental Site Assessments (ESAs) were performed at nine sites along the Canol Trail in 2009 and a further 18 sites in 2010.

A wire cleanup project was also initiated in 2009 to address communications wire along the Canol Trail which posed an entanglement risk for wildlife. This project was carried out by the Tulita Band with support

from Willow Lake Environmental Inc. (a Tulita-based company) through the Community Adjustment Fund administered by the Canadian Northern Economic Development Agency.

### FUTURE PLANS

The results of the Phase II ESAs will be examined in order to identify areas along the trail that require further investigation through Phase III ESAs and Risk Assessment in 2011/12 and 2012/13. These assessments will characterize risks to human health and the environment and will focus the development of appropriate remedial options.

A working group has been established to facilitate communication of the project's progress and to engage with key stakeholders to ensure all interests are identified, discussed and managed using an acceptable approach. Remedial options will be evaluated through consultation with the Government of the Northwest Territories (GNWT), local communities and organizations and the trail's heritage value will be taken into account throughout.

The GNWT has a commitment through the Sahtu Land Claim to develop the Canol Heritage Trail as part of the proposed Doi T'oh Territorial Park. Since the majority of the Canol Trail is on Crown Land, a land transfer agreement between the Crown and the Territory is required prior to park development.

Talks between INAC and GNWT senior management are ongoing regarding site remediation and future land transfer requirements. ■

## Great Bear Lake Sites

2 Contact Lake Mine

3 El Bonanza Mine

4 Sawmill Bay

5 Silver Bear Properties

The Great Bear Lake Sites are being remediated together due to their close proximity to one another. The sites are located along the shore of Great Bear Lake, between 300 and 430 km northwest of Yellowknife.

The Silver Bear Properties, in the Camsell River area, include Terra Mine and four satellite mines known as Northrim, Norex, Graham Vein and Smallwood. They produced primarily silver, copper and bismuth during the 1970s and early 1980s, until operations ceased in 1985. Contact Lake

1

Mine was originally a silver mine in the 1930s, then was mined for uranium from 1949-1950.

Originally staked in 1931, El Bonanza/Bonanza Mines were two silver mines located about 1 km apart. Minor uranium showings resulted in expropriation of the property by the federal government from 1940 to 1950 for strategic purposes, however, there was no mining activity at the site during this period. Until 1984, the property changed hands several times. During that time, drilling, mapping and geological surveys took place at the site, as well as some silver mining.

Sawmill Bay supported timber requirements and served as an intermediate site along the northern transportation route for Port Radium Mine. Ore from Port Radium was barged down to Sawmill Bay and from there, the majority of the ore was transported further south by air. The site has had a varied history with other known uses including: air fields and base camp for Royal Canadian Air Force's operations (late 40-50s), the construction of a LORAN Navigation System (50s), a staging area for the construction of the Distant Early Warning (DEW) Line (late 50s) and a commercial fishing lodge (late 50s until 1987). It is now considered an abandoned site.

## CONCERNS AT THE SITES

Concerns at this group of sites include waste rock, processed tailings, elevated metal concentrations, abandoned barrels, small amounts of hydrocarbons and asbestos residue, old buildings, scrap metal, and general debris. Concerns at Contact Lake also include elevated levels of gamma radiation.

At Sawmill Bay, environmental concerns include gamma contamination associated with historical support to Port Radium. All licensable material was removed from the site during a 1997 clean up led by Natural Resources Canada (NRCan). The remaining material at site is at a concentration moderately above the naturally occurring levels, but well below the levels used in the clean up criteria for Port Radium, and the site continues to be an NRCan responsibility. INAC and NRCan are working together to ensure remaining clean up efforts occur concurrently.

## REMEDIATING THE SITE

From 2006 to 2009, detailed site investigations were conducted at the sites and included water, soil and vegetation sampling, fish studies, analysis of hydrocarbons, tests to determine the type and extent of metals and other compounds, as well as demolition, structural and opening assessments.

A three-phased approach to the remediation of the Great Bear Lake sites was developed in consultation with Sahtu (Délı̨ne) and Tłı̨chǫ (Gamètì) community representatives. The application

for land and water use permits associated with the project was submitted to the Sahtu Land and Water Board in 2008. Supplemental information which was required to complete the package—specifically the finalized Sawmill Bay Remedial Action Plan (RAP)—was completed in 2010. The finalized RAP is based on the results of environmental assessments, human health and ecological risk assessment studies, best practices in mine closure, traditional knowledge, current use of the area, and community values.

The first phase (Phase I) began in 2010 after receiving the necessary permits from the Sahtu Land and Water Board. Phase I work at Contact Lake, El Bonanza/Bonanza Mines and Sawmill Bay included building demolition, barrel inspection and consolidation as well as consolidation of surface debris. At Sawmill Bay, 8,235 barrels were cleaned and crushed. The remediation of the Silver Bear Properties will take place in Phase II of the Great Bear Lake sites project.

### FUTURE PLANS

Phase I is expected to be completed by September 2011 and Phase II and III will follow. Remediation is expected to be complete in 2015/16. ■

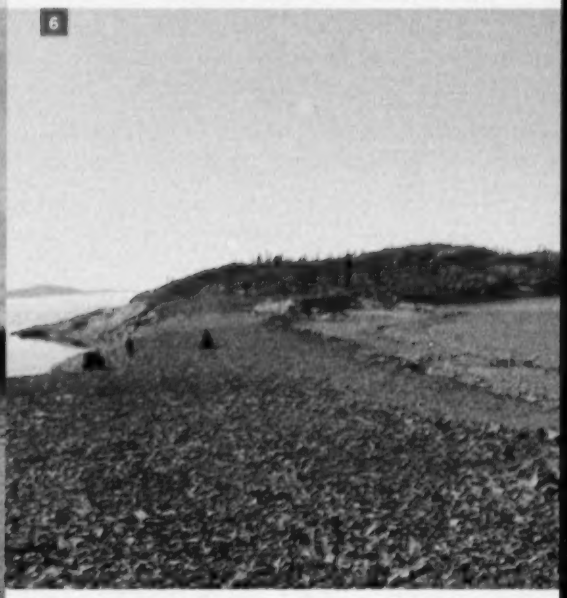
3

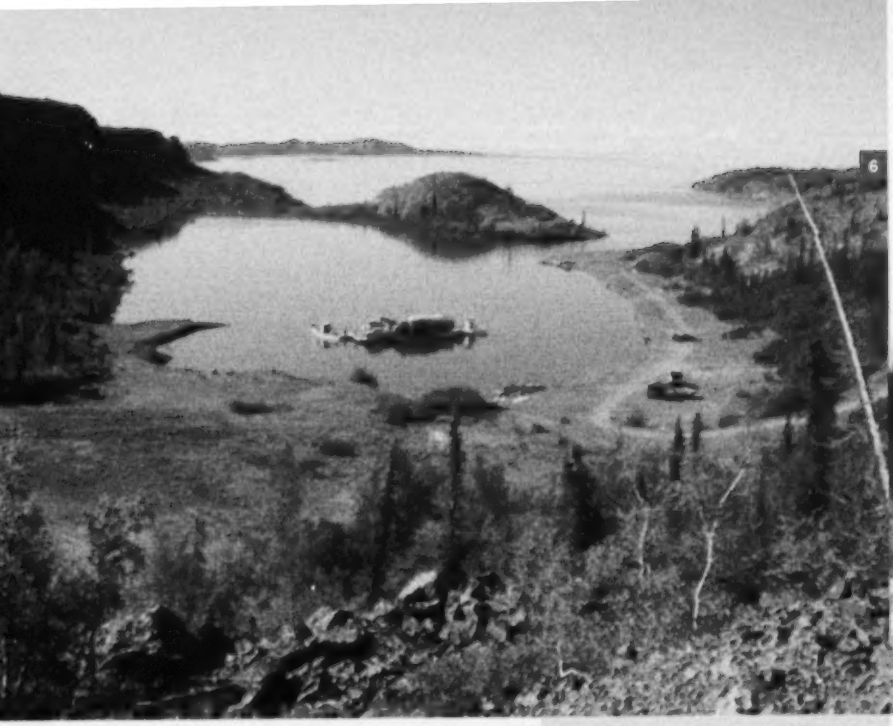
## 6 Port Radium Mine

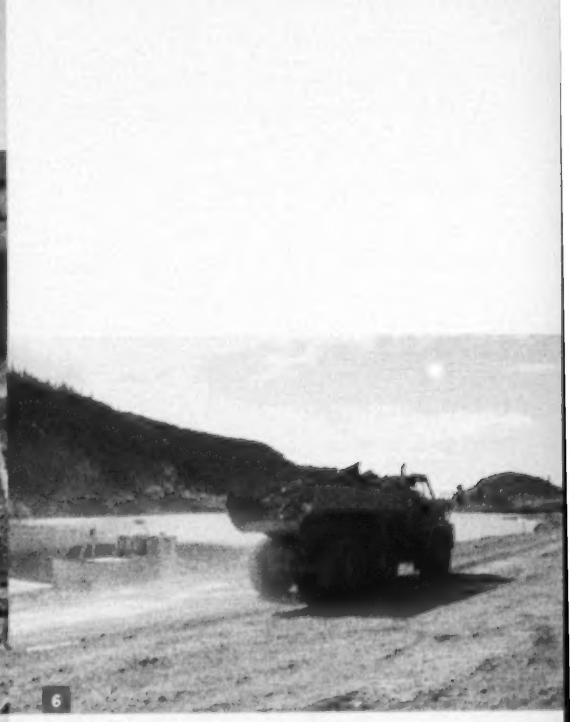
Port Radium Mine was located on a peninsula along the eastern shore of Great Bear Lake in the Northwest Territories, 440 km north of Yellowknife and 265 km east of the Dene community of Délı̨ne. Beginning in 1932, the site was mined for radium used in medical research. From the early 1940s to the 1960s, the site was mined for uranium, used to make nuclear weapons and for nuclear power.

The site was mined for silver until 1982 when it was decommissioned to silver mine standards. At that time, tailings were covered, mine openings were blocked, infrastructure was demolished and all valuable equipment was removed.

5


6





The site has been reassessed and further studied since 2000, due to concerns raised by the community of Délı̨ne. All studies and recommendations on how to address the site are done jointly by Canada and Délı̨ne.

### CONCERNS AT THE SITE

As a result of more than 40 years of mining, silver, copper and uranium were present in soils and surface water, localized to the immediate site. The site also had elevated gamma associated with the waste rock, and small amounts of hydrocarbons and asbestos residue.

### REMEDIATING THE SITE

Remediation of the Port Radium site was completed during the 2007/08 season. Studies and recommendations were developed and carried out by the Canadian Délı̨ne Uranium Team (CDUT) on which Canada and Délı̨ne worked closely together. The remediation

of Port Radium was carried out based on these studies and recommendations.

### FUTURE PLANS

Long-term monitoring is a very important commitment in the Port Radium Remediation Plan. For the first four years of monitoring, environmental and engineering inspectors travel to the site twice a year to make sure that the site remains in a stable condition, and that the remediation solutions are working. As well, water is sampled at the site once a year.

In year five of the monitoring program, which will be in 2012, inspectors and researchers will complete a more detailed study of the site. They will look at the health of fish in the Great Bear Lake area around Port Radium, as well as the plants and the soil. They will also examine sediments in Great Bear Lake close to the site. Finally, researchers will do a complete gamma survey of the entire Port Radium site, to make sure that the radiation covers are working the way they are supposed to. ■

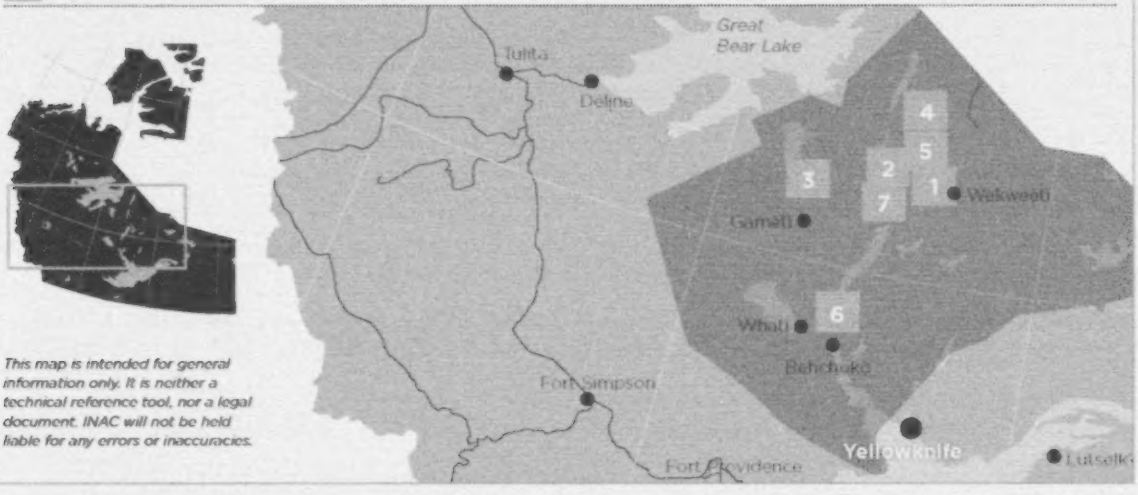
# Sites in the Wek'eezhii Area

Wek'eezhii is the management area established by the Tlicho agreement which was signed by the Government of Canada, the Government of the Northwest Territories and the Dogrib Treaty 11 Council on August 25, 2005 in Behchokǫ̀, NWT. It is the first-ever combined land claim and self-government agreement in the Northwest Territories.

There are four communities in the Wek'eezhii Area where the Tłı̨chǫ Government is located. They consist of Gamètì, Wekweètì, Whatì, and Behchokǫ̀. The traditional language of the Tłı̨chǫ people is Tłı̨chǫ (Dogrib).

A number of contaminated sites have been identified and prioritized in the Wek'eezhii Area, and identification and assessment is on-going.

| NO. | SITE NAME | PHASE | PAGE |
|---|---|---|---|
| 1 | Chalco Lake Mine | | 29 |
| 2 | Diversified/Indigo Mine | | 29 |
| 3 | Indore/Beaverlodge (Hottah) Mines | | 30 |
| 4 | Spider Lake | | 31 |
| 5 | Colomac Mine | | 31 |
| 6 | Rayrock Mine | | 33 |
| 7 | North Inca Mine | | 34 |




*This map is intended for general information only. It is neither a technical reference tool, nor a legal document. INAC will not be held liable for any errors or inaccuracies.*

## 1 Chalco Lake Mine

The Chalco Lake exploration site is located approximately 210 km north of Yellowknife near the Diversified/Indigo Mine site. It consists of two former camps, one dating back to the 1940s and another built as a mineral exploration camp in the 1970s.

### CONCERNS AT THE SITE

Concerns at the site included structures and materials left behind and two small areas of hydrocarbon contamination.

### REMEDIATING THE SITE

Debris removal from the site took place in the fall of 2009. This work included demolition of a building on the site, burning clean, combustible materials, and removal of all waste materials. While this work was underway, two small areas of hydrocarbon contamination were identified. A Phase II Environmental Site Assessment (ESA) was conducted on these areas in 2010.

### FUTURE PLANS

The results of the Phase II ESA will be reviewed in 2010/11 and will determine what, if any, further remediation is required at this site. ■

## 2 Diversified/ Indigo Mine

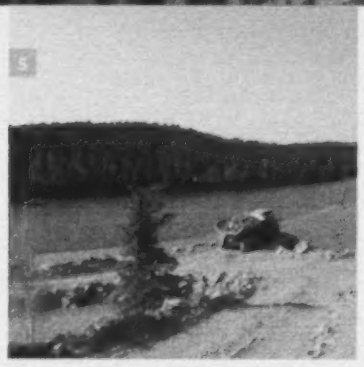
The Diversified/Indigo Mine site is located on Indin Lake, 205 km northeast of Yellowknife. Gold exploration on the site dates back to 1939.

### CONCERNS AT THE SITE

Concerns include structures and equipment left at the site, an unsecured mine opening, and potential hydrocarbon contamination.

### REMEDIATING THE SITE

The Phase I ESA was performed in 2009 and the Phase II ESA was performed in 2010. This work included the review of historical records and conducting sampling at the site.



### FUTURE PLANS

A Phase III ESA will be conducted on-site and will include detailed studies of the identified concerns. From the Phase III ESA, remedial options will be selected through input from the Tłı̨chǫ Elders and Government and then a Remedial Action Plan (RAP) will be developed. Remediation will include closure of mine openings, demolition of buildings and tanks and excavation of impacted soil. ■

## 3 Indore/ Beaverlodge (Hottah) Mines

The Indore and Hottah (Beaverlodge) mine sites are located 12 km apart on Hottah Lake, approximately 315 km northwest of Yellowknife. Indore Mine was originally staked for uranium exploration in 1950, and operated off and on until it was closed in 1956. Hottah Mine is a former uranium mine which had various owners between 1943 and 1977, after which, responsibility for the site reverted to the Crown.

### CONCERNS AT THE SITE

At Indore Mine, concerns include a small quantity of tailings which remain on land, some suspected underwater tailings, slightly elevated radioactive waste rock and sediment, a former dump site, miscellaneous debris, and asbestos-containing materials. There is also a mine opening and shaft, and the remains of former buildings.

At the Hottah Mine site, the remediation will address shafts and pits, groundwater quality, radiation levels in waste rock near the pits, drums, burned remains of former buildings, and miscellaneous debris and scrap which may contain asbestos.

### REMEDIATING THE SITE

The Phase III Environmental Site Assessment and Human Health Risk Assessment were completed in 2008/09. In 2010, remedial options were selected through input from the Tłı̨chǫ Elders and Government.

### FUTURE PLANS

A Remedial Action Plan will be developed over the winter of 2010/11. Full scale remediation will include closure of mine openings, addressing waste rock, and demolition of buildings and tanks. ■

## 4 Spider Lake

The Spider Lake site is a former exploration site located on an island at the centre of Spider Lake, 233 km northwest of Yellowknife. The island, called "Treasure Island," is 200 hectares in size. Exploration at the site occurred sporadically between 1945 and 1988.

### CONCERNS AT THE SITE

Concerns at the Spider Lake site include collapsing structures and debris left behind and potential soil contamination.

### REMEDIATING THE SITE

A Phase III Environmental Site Assessment (ESA) was conducted in 2009 and included the collection of soil, groundwater, surface water and sediment samples.

### FUTURE PLANS

Data collected during the Phase III ESA will be reviewed in 2011/12 and will determine whether further sampling is required. Remedial options will then be selected through input from the Tłı̨chǫ Elders and Government and a Remedial Action Plan will be developed for the site. Remediation is expected to begin in 2012/13. ■

## 5 Colomac Mine

Colomac Mine was a gold mine in operation from 1989 to 1997, located 222 km northwest of Yellowknife. It is one of three mines that reverted to the Crown in 1999 when the mine's owner at the time, Royal Oak Mines Inc., went into receivership.

### CONCERNS AT THE SITE

The main concerns at the site include tailings, hydrocarbons and water contamination. As the tailings and the tailings water contamination have already been addressed, the current focus is on diesel that leaked during operations that contaminated soil around the mill, areas of bedrock, and the Steeves Lake shoreline near buildings.

### REMEDIATING THE SITE

In 2002, water treatment at the site began to address water contaminated with cyanide and

cyanide-related compounds, ammonia and heavy metals. Treatment was accomplished through a process called Enhanced Natural Removal which is a proven natural solution for water treatment. It uses phosphorus to promote the growth of bacteria and algae which naturally absorb and degrade cyanide, cyanide-related compounds and metals in the water and then leave the water free of these compounds. Testing in 2005 showed water quality in Tailings Lake had already met the NWT water licence criteria and

was ready for discharge, three years ahead of schedule.

Remediation work at the site began in 2005 and included hydrocarbon remediation, construction of a new dam, capping exposed tailings and construction of an outlet channel for the treated water from Tailings Lake. Diesel and oil barrels left behind had to be washed, crushed, and discarded, or sent south via winter road for disposal in a hazardous waste facility.

Working with the Tłı̨chǫ Elders, a fence was constructed around the contaminated site to protect migrating caribou from the contaminants. The area was deemed safe for caribou in 2008 and the majority of the fence was dismantled later that year.

The contract for final remediation was awarded February 2010 and the contractor mobilized to site in spring of 2010. Throughout the summer, remediation work included demolition of buildings, remediation of the Steeves Lake shoreline, treatment of hydrocarbon-impacted soil and water, collection of free product, and routine monitoring of water quality.

## FUTURE PLANS

The majority of the remediation will be completed by winter of 2010/11 and the contractor is expected to demobilize from site in the spring of 2011. The camp complex buildings are the only remaining structures currently standing and those are scheduled to be demolished prior to demobilization. The treatment of remaining hydrocarbon impacted soils and final clean up will be carried out in 2011/12.

When all remediation work has been completed, a long-term monitoring and post-closure hydrocarbon management plan will be developed. The airstrip will remain in place as an emergency airstrip and the large steel warehouse known as "Big Blue" will remain on site at the request of the Tłı̨chǫ Government. ■

## 6 Rayrock Mine

Rayrock Mine, 45 km northwest of Yellowknife and 74 km northwest of Behchokǫ̀, was an underground uranium mine operated by Rayrock Mines Ltd. from 1957 to 1959.

### CONCERNS AT THE SITE

During operations at Rayrock Mine, approximately 70,000 tonnes of ore were processed, yielding 207 tonnes of uranium concentrate. Radioactive tailings were deposited on land and partly flowed into three small lakes. In 1959, two tailings basins contained 70,903 tonnes of radioactive tailings that had the potential to leach materials. The mine was also a potential source of radioactivity, through radon gas emissions from mine openings and ventilation shafts.

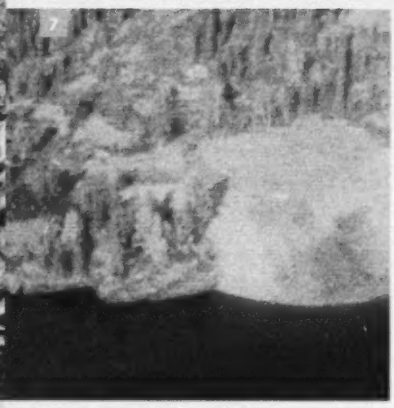
### REMEDIATING THE SITE

The site was remediated in 1996 and 1997, following several site assessments. This included sealing all mine openings and ventilation shafts, relocating radioactive material from the dump to the tailings piles and capping the tailings with a thick layer of silt-clay, followed by re-vegetation. Since then, the site has been monitored annually as part of the long-term monitoring program, with minor maintenance being carried out as required.

In the fall of 2009, a supplementary Environmental Site Assessment was carried out to look at the conditions of site closure in 1996. This work included the assessment of remaining hazardous (asbestos-containing materials) and non-hazardous debris (concrete piers and foundations) and the maintenance of the tailings cap. In the fall of 2010, the annual radon monitoring survey was completed.

### FUTURE PLANS

The site will continue to be monitored and maintenance activities will be carried out as required. A Detailed Quantitative Risk Assessment (DQRA) is scheduled for 2011/12 which will review the data collected to date and determine what further work, if any, is required at this site. ■



## 7 North Inca

The North Inca mine site is located approximately 205 km northwest of Yellowknife and 70 km east of Wekweètì. The site was a gold exploration property that operated between 1945 and 1949. On-site exploration activities included geological mapping, surface and underground drilling, including an exploration shaft. There has not been significant exploration activity on the site since 1949.

### CONCERNS AT THE SITE

Concerns at the site included a partially open mine shaft, deteriorating buildings, two above-ground fuel storage tanks, and possible asbestos-containing materials.

### REMEDIATING THE SITE

Remediation began in 2009 and included the closure of mine openings, demolition of buildings and removal of fuel storage tanks. Full remediation of the site was completed in 2009/10 with the removal of all materials from site and final demobilization in 2010. An historic artifact—a D3 Caterpillar – was discovered in 2009 at the north end of the property and will be removed on the 2011 winter road.

### FUTURE PLANS

Initial site monitoring was conducted in the summer of 2010 with further site inspections to be carried out in 2012 and 2014 to confirm the effectiveness of the remediation work. These site inspections form part of the short-term monitoring program. ■

# Sites in areas subject to on-going comprehensive land claim negotiation

There are a number of on-going negotiations with Aboriginal people in the Northwest Territories:

1. **The Akaitcho Dene in the South Slave area (south-eastern portion of the NWT)** —represented by the Akaitcho Dene First Nations in the communities of Fort Resolution (Deninu Kue), Lutsel K'e, Ndilo and Dettah—are negotiating an agreement covering their asserted territory, which extends into areas north of Great Slave Lake, including the area around the City of Yellowknife. The Aboriginal languages spoken by the Akaitcho First Nation members are Tłı̨chǫ and Chipewyan Dene.

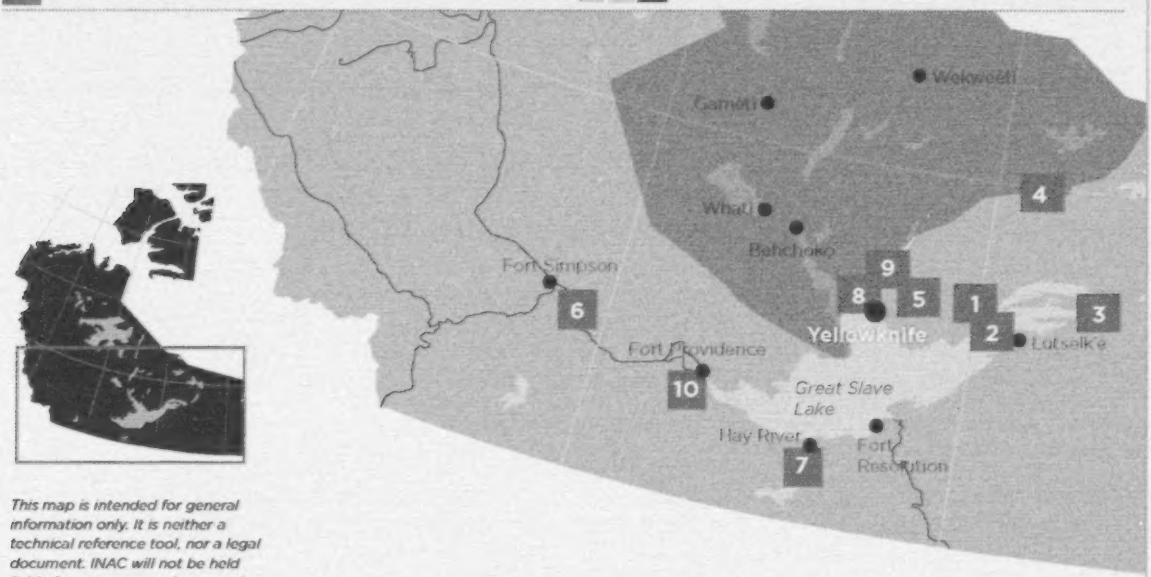
2. **The Northwest Territory Métis in the South Slave area (south-eastern portion of the NWT)** —represented by the Northwest Territory Métis Nation (NWTMN), comprised of three community Métis councils in Fort Resolution, Hay River and Fort Smith—are negotiating an agreement covering their asserted territory, which extends to the north shore of Great Slave Lake. The Aboriginal languages spoken by the Northwest Territory Métis include the Dene languages of the NWT, as well as Cree and Michif.

3. **Most of the Dene and Métis in the Dehcho area (the south-western portion of the NWT)** —represented by the Deh Cho First Nations (DFN)—are negotiating an agreement covering their asserted territory. The DFN is made up of Dene bands and Métis locals in the communities of Fort Providence, Fort Simpson, West Point, Wrigley, Kakisa, Jean Marie River, Trout Lake and Nahanni Butte. The Dene of the Hay River Reserve (K'atlodeeche First Nation) are part of the Deh Cho process but have also been pursuing discussions that may lead to a separate community comprehensive land claim. In the southernmost part of the Dehcho area, the Acho Dene Koe First Nation of Fort Liard are negotiating a separate community comprehensive land claim for Dene and Métis of that area. The Aboriginal languages spoken by the Dehcho Dene and Métis are South Slavey Dene and Michif.

In most cases, interim measures agreements are in place to clarify how the Government of Canada works with Aboriginal groups on decisions that may affect rights and interests during the negotiation process and before a final agreement. These include the Akaitcho Interim Measures Agreement, the Dehcho Interim Measures Agreement, the Dehcho Interim Resource Development Agreement and the NWTMN Interim Measures Agreement. In the Dehcho and Akaitcho processes, interim land withdrawals are in place to temporarily protect some lands against the establishment of new land rights while negotiations proceed.

A number of contaminated sites have been identified on lands in areas under negotiation. Identification and assessment of these sites is ongoing.

| NO. | SITE NAME | PHASE | PAGE |
|---|---|---|---|
| 1 | Bullmoose Mine/Ruth Mine Area | | 37 |
| 2 | Great Slave Lake Area | | 37 |
| 3 | Stark Lake Advanced Exploration Site | | 38 |
| 4 | Tundra Mine | | 39 |
| 5 | Hidden Lake Mine | | 40 |
| 6 | Checkpoint Highway Maintenance Yard | | 40 |
| 7 | Hay River Sour Gas Wells | | 41 |
| 8 | Giant Mine | | 42 |
| 9 | Discovery Mine | | 43 |
| 10 | Axe Point Military Site | | 44 |




*This map is intended for general information only. It is neither a technical reference tool, nor a legal document. INAC will not be held liable for any errors or inaccuracies.*

## 1 Bullmoose Mine/ Ruth Mine Area

Bullmoose Mine, Ruth Mine, Storm Mine, Joon Mine, Beaulieu Mine, Spectrum Lake, Chipp Lake Mine

These sites are being assessed together, due to their close proximity to one another. The sites are located between 74 and 90 km east of Yellowknife and the majority of the activity at these sites was gold exploration and mining. Operations at each of the sites occurred intermittently between the 1940s and 1980s.

### CONCERNS AT THE SITE

Concerns at the sites include hydrocarbon contamination, waste rock and tailings with metal contamination as well as physical hazards such as old buildings, mining equipment, debris and mine shaft openings.

### REMEDIATING THE SITE

The site investigations for Bullmoose and Ruth mines are finished and draft Remedial Action Plans (RAPs) have been developed. Additional assessment information is needed for other sites and that must be completed before remediation can begin.

### FUTURE PLANS

In 2010/11, once additional assessment information for other sites is collected, a draft RAP will be prepared and reviewed by affected and interested parties. In addition to consulting on the draft RAP, interested parties will be able to take part in site tours. ■

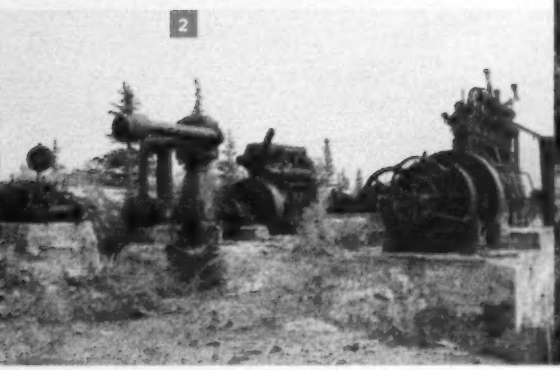
## 2 Great Slave Lake Area

Blanchet Island Mine, Outpost Island Mine, Copper Pass Mine, Destaffany Mines

These mine sites are being assessed together due to their close proximity. The four sites are located near or within the east arm of Great Slave Lake, east and southeast of Yellowknife. Blanchet Island was a cobalt nickel mine in the late 1960s, Outpost Island was mined for gold, copper and tungsten in the 1950s and the Destaffany Mines were mined in the 1940s and 1950s for tantalum, niobium and lithium. The Copper Pass site was mined for nickel and copper with the majority of mining activity occurring in the late 1960s.

### CONCERNS AT THE SITE

Concerns at the sites include hydrocarbon contamination, waste rock, tailings, drums and physical



hazards such as dilapidated structures, unsealed mine openings and camp debris.

### REMEDIATING THE SITE

Assessment work will be completed at all sites in 2011. Upon completion of this work, a draft Remedial Action Plan (RAP) will be developed for the sites. This approach will allow the RAP to address potential logistical and cost savings by undertaking the remediation of the sites together. The RAP will be prepared and reviewed by affected and interested parties to confirm the appropriate remedial activities.

### FUTURE PLANS

Development of the RAP will continue in 2011/12, with remediation activities expected to begin in 2013 and conclude in 2014. Once complete it will be determined if long term monitoring is required. ■

## 3 Stark Lake Advanced Exploration Site

Stark Lake Advanced Exploration Site is a former uranium exploration site 200 km southwest of Yellowknife on Stark Lake. The site was first staked in 1949 and work continued until 1954 when it was concluded there was insufficient quantity to warrant continued exploration. There is currently no active mineral tenure in the area.

### CONCERNS AT THE SITE

Concerns include hydrocarbon impacted soils, radioactivity in waste rock, as well as hazardous and non-hazardous materials such as fuel drums, dilapidated structures and a domestic waste dump.

Community members of Lutsel K'e have raised concerns about the impact of activities at the site on fish and wildlife. A study conducted in 1998 by Northern Environmental Consulting and Analysis (NECA) and the Environment Committee of the Lutsel K'e Dene First Nation found levels of radionuclides in fish and mammals in the Lutsel K'e area consistent with the same species elsewhere.

Due to elevated radiation levels on waste rock piles, the study suggested people avoid the site to ensure they are not ingesting or inhaling contaminated dust.

### REMEDIATING THE SITE

A Phase I/II ESA was conducted in 2010 to inventory materials and characterize environmental conditions. Site assessment fieldwork was completed in August 2010.

### FUTURE PLANS

A finalized site assessment report will be completed by March 2011 and the results will be shared with the community of Lutsel K'e in the summer. ■

## 4 Tundra Mine

Tundra Mine is a former gold mine located 240 km northeast of Yellowknife. Mine operations began in 1964. This is one of three mines that reverted to the Crown in 1999 when the owner of the mine at the time, Royal Oak Mines Inc., went into receivership.

### CONCERNS AT THE SITE

The previous mine owner, Giant Yellowknife Mines, used the site to process ore and to dispose of tailings from nearby Salmita Mine (remediated in the late 1980s). The main concerns are arsenic and metals, the majority of which are contained within the 62.4 hectares Tailings Containment Area (TCA). The water in the TCA has elevated levels of arsenic and water downstream from the TCA has been affected.

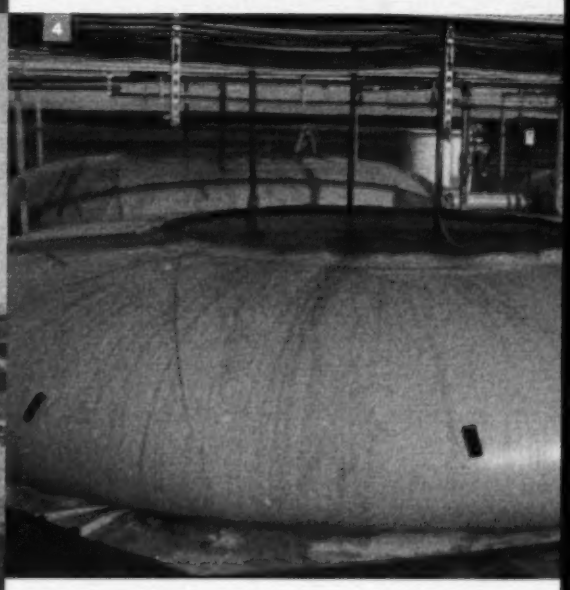
### REMEDIATING THE SITE

Tundra Mine has been in care and maintenance since 1999 with activities including dam repairs, landfill repairs, geotechnical inspections of dams and water management, and water quality monitoring. In 2007, Phase I of the remediation was completed and included the removal of buildings and hazardous waste, the construction of a non-hazardous landfill and the capping of mine openings. In the summers of 2009 and 2010, water treatment was carried out on-site to treat the water in the TCA.

The contract for Phase II was awarded in June 2010 and will address remaining challenges at the site, including treating water in the TCA, treating hydrocarbon impacted soils, covering tailings and waste rock, and decommissioning dams.

### FUTURE PLANS

Full scale mobilization of equipment and fuel to the site will occur using the winter road in 2011. Phase II remediation work will take four to five years to complete and, following site closure, long-term monitoring will begin. A monitoring plan for the site has been developed and includes monitoring fish health and the water quality on-site and downstream of the TCA. Once all remediation work is complete, long-term monitoring requirements for the site will be finalized.



## 5 Hidden Lake Mine

Hidden Lake Mine is a former underground gold mine located 45 km northeast of Yellowknife. The mine opened in 1959 with most mining production taking place in 1968. Since closure in 1969, there has been very limited activity.

### CONCERNS AT THE SITE

In 1998, the Tibbitt Lake forest fire burned down all of the buildings and structures, leaving physical hazards such as abandoned mining equipment, two unsecured mine openings, scattered metal debris and drums, buried scrap metal and submerged metal drums near the dock area. Environmental concerns included waste fuel, deposits of tailings with metals and hydrocarbon contamination, and surface fuel contamination around the sites of old buildings and fuelling areas.

### REMEDIATING THE SITE

The Remedial Action Plan was finalized in 2009 and is based on the preferred remedial plan decided upon during consultations held in 2008 with the Tłı̨chǫ, the Yellowknives Dene First Nations and the North Slave Métis Alliance. Remediation began in 2010 and included the remediation of hydrocarbon impacted soils, backfilling of the west shaft, capping of the east shaft and final site grading. Metal, wood and other debris was also collected and sorted into containers which will be removed from site on the winter road in March 2011.

### FUTURE PLANS

On-site remediation is now complete and demobilization from site is scheduled to take place via winter road in March 2011.

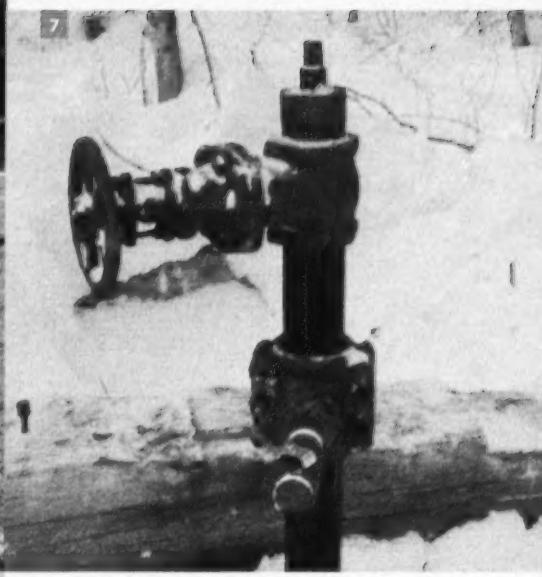
Confirmatory water quality sampling will take place in the spring of 2011, followed by long-term monitoring of the mine cap as required. ■

## 6 Checkpoint Highway Maintenance Yard

The former Checkpoint Highway Maintenance Yard was originally a highway maintenance area built in the 1970s and was later used as a logging and milling operation in the 1990s. It is located near the junction of the Mackenzie Highway (Hwy 1) and Liard Highway (Hwy 7), 63 km south of Fort Simpson. The site is adjacent to the Jean Marie River waterway and approximately 60 km upstream of the community of Jean Marie River.

Remediation of the site is being carried out jointly by INAC and the Government of the Northwest Territories Department of Transportation. The proposed remediation work consists of treating hydrocarbon-contaminated soil in a land farm,

6



7

final grading of the site and removing metal contaminated soil and site debris from the surface and subsurface to be transferred off-site to a licensed waste disposal facility.

### CONCERNS AT THE SITE

While in operation, waste generated at the site was burned and disposed of in one section of the property. Then, when it was abandoned, the majority of equipment and materials not removed, were buried. Site assessments show there are elevated levels of hydrocarbons and metals in groundwater; however, there was no indication of contamination of Jean Marie River from these sources. There is a dump at the site containing buried waste, crushed fuel drums, tires, wood, fiberglass insulation, metal debris, a culvert and a vehicle. There is also surface domestic debris including appliances, tires, empty drums and scrap building materials.

6

### REMEDIATING THE SITE

During the 2010 work season, the team continued to excavate and treat contaminated soils and dig up buried hazardous and non-hazardous waste which will be disposed of at a licensed waste disposal facility.

### FUTURE PLANS

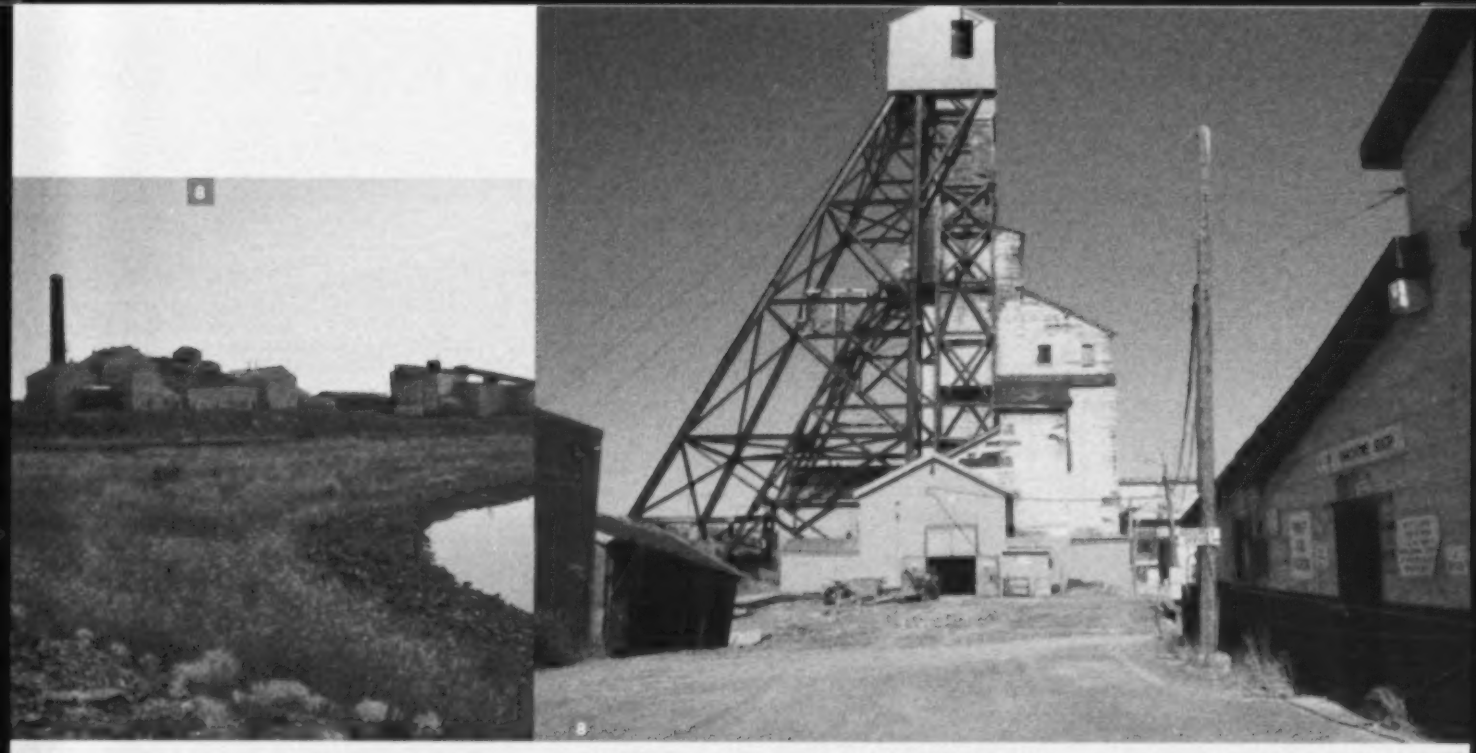
The excavation of hydrocarbon-impacted soils and buried waste is expected to be complete by the summer of 2011 with landfarm treatment continuing for two to three years. Water quality monitoring will continue at the site until remediation is complete. ■

## 7 Hay River Sour Gas Wells

There are seven abandoned gas wells near the Hay River Golf Course/Ski Club, approximately 12 km outside the Town of Hay River. In 1922 and again in the 1940s, test wells were drilled in the area by the Frobisher Exploration Company Limited of Yellowknife. Although some gas was discovered at first, there was no actual oil found and the wells were abandoned. In 2005, CARD was notified that three of the gas wells were in questionable condition and worked with the National Energy Board to conduct field investigations.

### CONCERNS AT THE SITE

The wells are not easily accessible by the public, nor are they located near residents. As a safety precaution, until the wells are permanently secured, signs and flagging tape have been posted in



the area of the well sites to alert the public to the possible danger of sour gas (hydrogen sulphide [$H_2S$]).

The wells were tested for hydrogen sulphide and overall stability, and re-abandonment options were examined. Although no levels of hydrogen sulphide were found that pose an immediate threat to human health and wildlife, it was concluded that the wells should be more permanently secured using modern methods.

### REMEDIATING THE SITE

With investigations of wells complete, CARD has hired a contractor to design and close the wells. In 2010/11, the contractor will engage with all interested parties to determine the approach and complete the re-abandonment of the wells.

### FUTURE PLANS

Final site clean-up and inspection of closed wells is planned for 2011/2012. ■

## 8 Giant Mine

Giant Mine began operations in 1948 and became one of Canada's most prolific gold mines. Over its lifespan, Giant Mine produced more than seven million ounces of gold and played a significant role in the economic growth of Yellowknife. This is one of three mines that reverted back to the Crown in 1999 after the mine's owner at the time—Royal Oak Mines Inc—went into receivership.

### CONCERNS AT THE SITE

The main issue at the site is the 237,000 tonnes of toxic arsenic trioxide dust stored underground. This is equivalent to seven and half 11-storey office buildings. The dust is a by-product of the production process, when mined ore was roasted to release the gold. On the surface level there are also tailings ponds, contaminated soils, old mine structures and other buildings that require remediation.

### REMEDIATING THE SITE

In 2005, the Government of Canada and the Government of the Northwest Territories (GNWT) signed a 10-year Cooperation Agreement on the management and remediation of Giant Mine. The two governments agreed to work together to address both surface and underground aspects of the mine site clean-up. In 2007, a Remediation Plan for Giant Mine was submitted to the Mackenzie Valley Land and Water Board as part of a water license application.

The City of Yellowknife sent the Remediation Plan to an environmental assessment based on concerns about potential negative effects. The Mackenzie Valley Environmental Impact Review Board began its environmental assessment of the Remediation Plan in April 2008.

The Remediation Plan outlines the clean-up plans for the entire mine site, including the surface remediation (demolition of buildings, tailings clean-up), and

the subsurface containment of arsenic trioxide dust using the Frozen Block Method. Under the Remediation Plan, the arsenic trioxide dust that is safely stored underground in chambers behind concrete bulkheads will be frozen using a freeze plant and thermosyphons to extract the heat from the ground - thereby mimicking the pre-existing natural permafrost conditions.

While the remediation plan undergoes environmental assessment, INAC has been able to proceed with a Freeze Optimization Study at Giant Mine. This study is a small-scale test of the frozen process which was proposed in the remediation plan. Construction for the Freeze Optimization Study has been on-going since June 2009.

The study will be used to inform the environmental assessment process and provide information about the operation such as power requirements, rate of freezing, as well as more accurate cost estimates.

### FUTURE PLANS

After the Review Board completes its environmental assessment, the Mackenzie Valley Land and Water Board will review and evaluate the plan, and ultimately determine the timing of the next steps for the clean-up of the Giant Mine site. Until then, regular care and maintenance will ensure the continued protection of human health and the environment. Care and maintenance work includes maintaining the mine in an environmentally-compliant state by pumping and treating contaminated mine water. ■

## 9 Discovery Mine

Discovery Mine was an abandoned gold mine on the west shore of Giauque Lake, approximately 80 km northeast of Yellowknife. The mine operated from 1949 to 1969 and was one of the most profitable gold mines in the country.

### CONCERNS AT THE SITE

At closure, approximately 1.1 million tonnes of acid-generating tailings containing mercury had been spread over 32 hectares of land and 3.7 hectares of lake sediment above the low water level. There was also asbestos, lead-based paint, old buildings, mine structures, unsealed mine openings and soils containing hydrocarbons on site that posed health and/or safety risks.

### REMEDIATING THE SITE

Phase I of remediation was completed from 1998 to 2000, with the major accomplishment being the capping of tailings with clay and rock. Phase II remediation, completed in 2008, included sealing mine openings, decommissioning all site buildings, addressing contaminated soil, stabilizing the borrow pit, and removing hazardous waste. Short-term monitoring began in 2000 and has been conducted every year since to ensure conditions are improving.

### FUTURE PLANS

Results of the monitoring program have been positive. In 2010/11, INAC will make a recommendation to the Mackenzie Valley Land and Water Board on how often and what type of future monitoring should be done to ensure residual risks are properly managed. ■

9

9

## 10 Axe Point Military Site

Axe Point is located on the Mackenzie River, 60 km west of Fort Providence. The site operated for several years as an airstrip, staging area and camp along the winter road to Norman Wells for the American military during World War II. The site supported construction of the CANOL Project, an oil pipeline between Norman Wells and Whitehorse.

### CONCERNS AT THE SITE

Investigations found elevated levels of hydrocarbons and metals in soils and groundwater on-site. Geophysical surveys identified buried materials on-site. There were seven collapsed buildings, metal debris, a boiler, heavy equipment and old batteries. There were elevated levels of arsenic, lead and uranium in some soil at the site, as well as iron, manganese, cadmium and selenium.

### REMEDIATING THE SITE

Remediation work concluded in 2007. Activities included regulatory approval of remediation strategy, site visits, community meetings and consultation, an archaeological study, brushing of trails used for monitoring, removal of surface and hazardous debris, filling in and grading cellars, and water quality monitoring. The archaeological study found nothing of significant importance on-site, but classified the old village site, adjacent to the west, of significant historical importance.

### FUTURE PLANS

With remediation complete, no additional monitoring is required. ■

# What is found at NWT Contaminated Sites?

A variety of substances and hazards are found at contaminated sites in the NWT. Some substances are naturally occurring but have become a problem due to development, while others were brought into the area for a specific purpose. Below is information about some significant contaminants and hazards found at contaminated sites in the NWT.

**Acid-generating waste rock and tailings**
Also commonly referred to as acid rock drainage. During mining, rock is disturbed and minerals that were contained in the rock are exposed to oxygen and the environment. If the rocks are naturally acidic, this can lead to the creation of an acidic environment which can be transported by water.

**Ammonia**
Commonly found at mine sites where cyanide is used. Ammonia occurs when cyanide breaks down (degrading), and is found in tailings and tailings water. Ammonia is also used in explosives.

**Arsenic trioxide**
Rock mined in Yellowknife and some other gold deposits in the NWT that are rich in arsenopyrite, a mineral that has a high arsenic content. The ore in this area was roasted to release the gold. When it was roasted, arsenic was also released as a gas. The gas cooled and became arsenic trioxide dust.

**Cyanide**
Chemical added during the flotation process to separate gold from ore. Cyanide is brought to the site as a powder. After it is used in the flotation process, it ends up in tailings and tailings water.

**DDT**
A pesticide commonly used at site in the past to help workers deal with mosquitoes. It was brought to the site in barrels, and was used liberally.

**Hazardous waste**
Other potentially harmful substances brought to the sites and used in ongoing operations. For example, several sites had on-site assay laboratories, which involved lab chemicals. Antifreeze, asbestos and batteries were also common on sites.

**Hydrocarbons**
All petroleum-based products, such as fuels, oil, and grease used at sites for heating, power generation and vehicles. If these products are not handled or stored properly, there can be leaks and spills, which contaminate soil and water.

**Lead**
Substance found in paint, batteries and hydrocarbons use, such as leaded fuels.

# Commonly Used Terms and Acronyms

**Mercury**
Substance historically added during the flotation process to separate gold from ore. Mercury is brought in as a liquid. Once used, it remains a liquid and can be found in tailings and tailings water.

**PCBs**
Oily substance brought to sites for use as a coolant in electrical equipment. PCBs were also mixed with paint used as a moisture barrier. If these products are not disposed of properly, they can cause contamination of soils, air and water, and bioaccumulation in mammals.

**Physical hazards**
Physical facilities required for on-going operation of sites, such as buildings, air strips and mine workings which have decayed over time and become safety risks.

**Uranium-related waste**
Waste rock and other material left over from the mining process. Uranium naturally gives off radiation as part of the on-going decaying process. When uranium is mined, it is exposed to oxygen and the decaying process is accelerated. Uranium-related waste is put in tailings containment areas, resulting in a higher concentration and higher than natural radiation levels.

**Contaminant**
Any physical, chemical, biological or radiological substance in the air, soil or water that has an adverse effect. Any chemical substance with a concentration that exceeds background levels or which is not naturally occurring in the environment.

**Contaminated Site**
A site at which substances occur in amounts above what would be natural and pose, or will likely pose, a hazard to human health or the environment, or exceed levels specified in policies and regulations.

**Reclamation**
The process of reconverting disturbed land to its former state or other productive uses.

**Remediation**
The removal, reduction, or neutralization of substances, wastes or hazardous material from a site so as to prevent or minimize any adverse effects on the environment or public safety.

**GNWT**
Government of the Northwest Territories

**INAC**
Indian and Northern Affairs Canada

**CARD**
Contaminants and Remediation Directorate

IOL
Imperial Oil Limited

ESA
Environmental Site Assessment

RAP
Remedial Action Plan

DFN
Dene First Nation

NWTMN
Northwest Territories Metis Nation

TCA
Tailing Containment Area

NCP
Northern Contaminants Program

FCSAP
Federal Contaminated Sites Action Plan

NWT-RCC
Northwest Territories Regional Contaminants Committee

DND
Department of National Defence

# For more information

For more details on any of the contaminated sites mentioned in this book or any other related questions, please contact:

**Contaminants and Remediation Directorate (CARD) office**
Indian and Northern Affairs Canada
NWT Region
P.O. Box 1500
Yellowknife, NT X1A 2R3
Phone: (867) 669-2416
Email: ntcard@inac-ainc.gc.ca

**INAC's NWT Regional website**
www.nwt-tno.inac-ainc.gc.ca

**Giant Mine Remediation Project**
www.giant.gc.ca

**INAC's Mine Site Reclamation Policy for the Northwest Territories**
www.ainc-inac.gc.ca/nth/mm/pubs/recpolnwt/recpolnwt-eng.asp

**INAC's Northern Contaminated Sites Program**
www.ainc-inac.gc.ca/ps/nap/consit/index_e.html

QS-Y248-000-EE-A4
Catalogue: R71-69/2010E-PDF
ISBN: 978-1-100-17542-3